ROOF CUTS & RAFTER LENGTHS

BY A.W.HANCOCK

AUTHOR OF "APEX RAFTER TABLES"

① PLUMB CUT RAFTER
② PLUMB CUT HIP
③ SIDE CUT RAFTER
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⑤ PLUMB CUT PURLIN
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8TH EDITION

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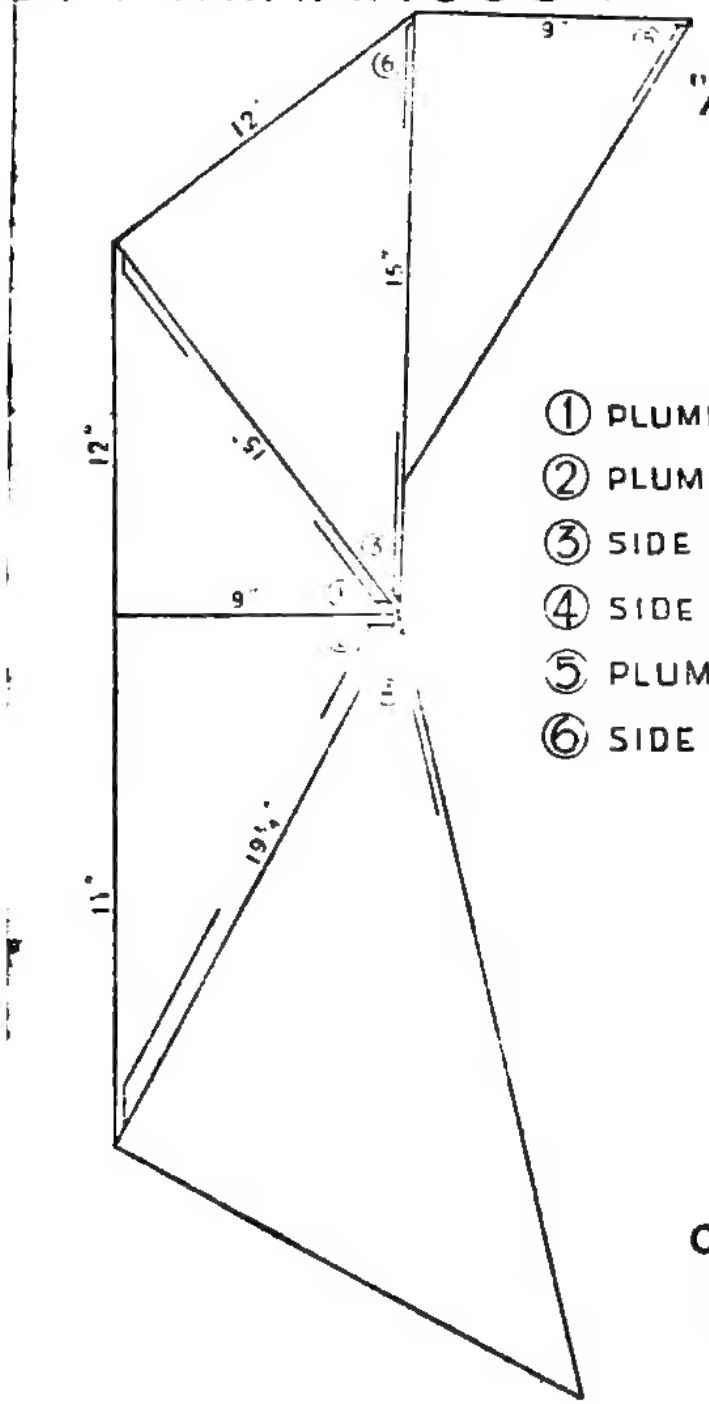

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WHY THIS BOOK?

A Stop, Look and Listen sign is never popular when one wants to get on with the job.

The writer was quite prepared for a doubtful reception of that part of the material previously published as "The Apex Rafter Tables," and which is now included with the data gathered between these covers.

Although quite confident of my argument. it was not at all certain that the material so published would be favourably received, or even read, but confirmation of the value of the figures published was forthcoming at once in the form of numerous appreciative letters.

This reaction continued, and although there is always a kindly minority ready to endorse almost anything one may choose to write, an insistence for that material to be re-assembled and implemented became widespread, and impressed the writer to the extent of responding in the form of this book.

It would be a rather difficult task for someone to come along and tell a tradesman to Stop, Look, Listen and ponder a while as to whether, taking present day standards into consideration, the old method's aren't a bit costly, and would it not be advisable to allow someone with a new conception of this old subject to have a hearing, but the average building Tradesman, whether Master Builder

or Journeyman, young or old, is always ready to read and applaud any writer who can demonstrate a method whereby the time previously taken to do the job could be reduced considerably.

It is not surprising that, notwithstanding the amount of literature written on this subject, men in increasing numbers are beginning to pause and wonder, as they themselves put it, "just where they are at," and asking if, after all, there is not a short cut along the pathway of roof cutting that, if followed, would reduce the journey by half—good business for all concerned!

This short cut is a reality, and is submitted in these pages and in order that the argument will be made more complete, the writer has included several chapters not hitherto published, and the whole work is sent forth in the hope that it will merit the consideration and approval of Building Tradesmen whenever English figures are used.

A. W. HANCOCK, Author.

METHOD OF CONSTRUCTION

This method of roof construction is the result of observation on actual work, extending over a great period of years as a roofing contractor specialising in builder's roofing. The writer has always taken this as a tribute to this method, that although these builders had their own staff of carpenters, our firm was always called on to cut and pitch their roofs. The figures used in these pages are not new and no one in living memory can lay claim to have invented them, and any carpenter with an average education can work them out for himself. I do claim, however, that the method of applying these figures belongs to the writer and is original. The writer has endeavoured to set out this argument in simple language and plain sketches, not filling these pages with a mass of complications more likely to confuse than otherwise. If there is any matter included in these pages that the reader might think not necessary, believe it or not, the writer has seen some peculiar things happen in roofing, and the observations in these pages may be the means of obviating these happenings, and if so my time and yours has not been wasted. The writer has endeavoured to show the methods used in setting out the various cuts and has reduced the data so that it can all be set out on a four-inch piece of timber. It is not necessary to use the drawings showing the cuts, as the angle of every cut is shown on the same page of the rafter table selected.

PITCH.

The origin of the word pitch as applied to roofing is somewhat obscure, but is generally accepted as a specified portion of the span. Taking 24 feet as the span of a building, if the roof rises 8 feet that would be ⅓ pitch. A rise of 6 feet would be ¼ pitch. A rise of 12 feet would be ½ pitch, or in other words the roof would rise one-half the width of the building.

SELECTING A PITCH.

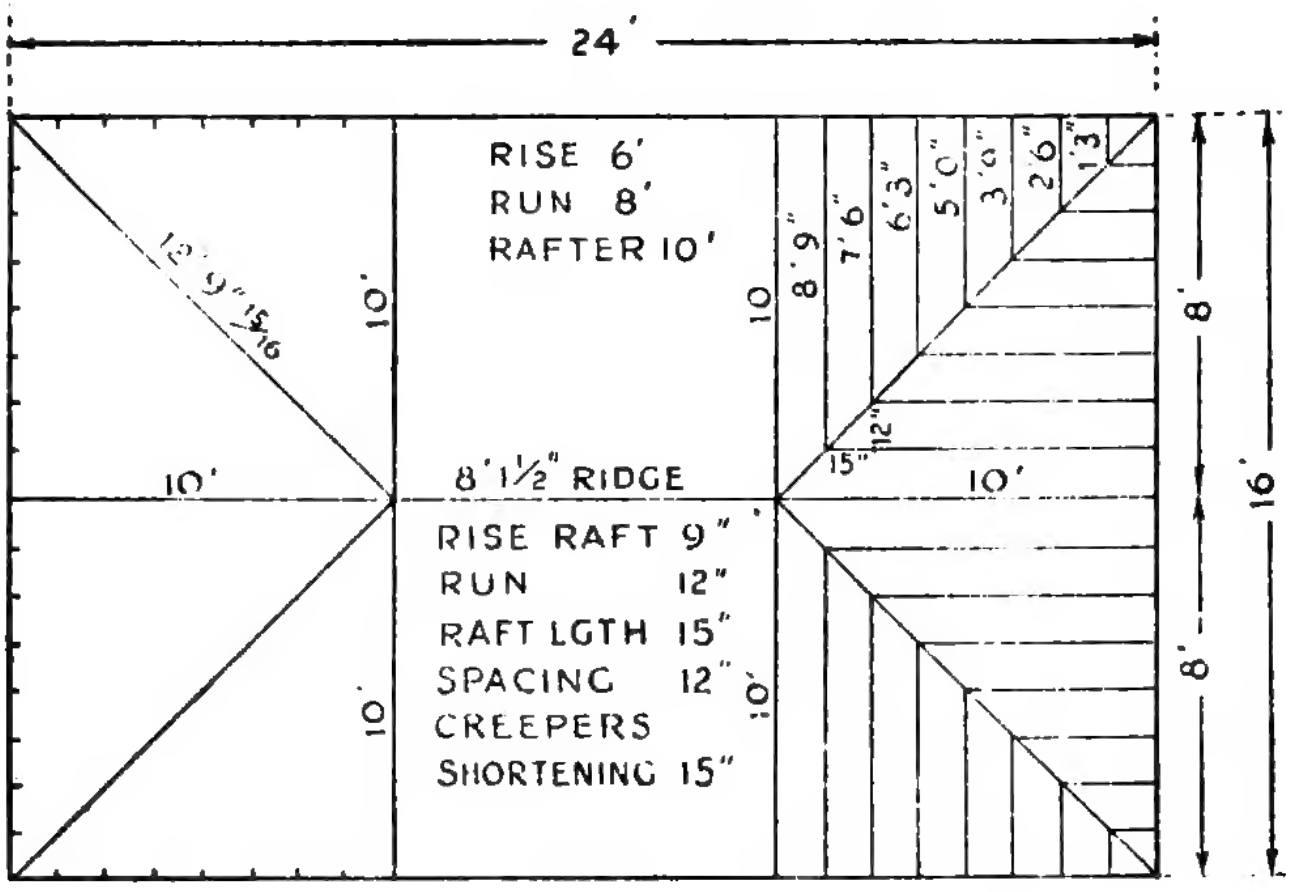
In the case of a roof to be covered with iron, the reader would select a pitch to suit the lengths of iron available, but for a tile roof it is quite another matter, as there are two factors to decide, one being a rafter length to suit the lengths of tiles, which should wherever possible be put on without a cut row. These rafter tables give a wide range of rafter lengths, and by comparing the rafter length selected with the number of rows of tiles, it may then be found that your rafter length will mean cutting a row of tiles. In this case one page either way in the tables will give rafter length and tiles of a corresponding length. It may be necessary to move up or down two pages. If it is decided to pitch the roof at 30 degrees and it will not give full rows of tiles, consult the next page. If this page gives a rafter length to suit, the pitch of the roof will be altered very little, as the rise would only be altered ¼ inch to every foot. The other factor to be considered

is the inclination of a roof that will shed water underneath as well as on top. The writer has found that with a 30 degree pitch water will find its way through a tile, and will trickle down the underside of the tile and find its way out on to the top of the next row, but lower the pitch 2 degrees and whatever water comes through a tile will drop straight down on to the ceilings. This would not apply to a broken tile that lets a fair amount of water through, but to the small leaks that the tiler cannot detect when spreading tiles. This is one of the reasons why Tiling Contractors will not guarantee their work when a roof is pitched under 30 degrees. For this reason alone a tile roof should never be pitched under 30 degrees, or a rise of 7 inches to 1 foot run.

FINDING RAFTER AND HIP LENGTHS FOR ¾ PITCH.

For the purpose of demonstrating this method of roofing by figures, the whole of the data and drawings within the covers of this book will be devoted to one pitch, ¾, and when this is understood every conceivable pitch will be just as readily understood. The figures 6-8-10 so universally used by builders for squaring structures of all kinds really belong to this Pitch, and it is these figures that the writer uses to set out the roof shown on Fig. 1, spacing the rafters one foot apart to simplify the drawing, making it easy to understand, and showing the definite result

FIG.1



NOTE PROPORTION OF FIGURES 6, 8', 10' 9", 12", 15"

obtained. As this building (Fig. 1) has a span of 16 feet it follows that half the span or run is 8 feet, and the rise is given as 6 feet which gives the two sides of a right angle triangle, being 6 feet rise to 8 feet run. The third side of the triangle must be 10 feet, which is the correct rafter length from centre of ridge to plumb cut at wall plate. The question arises here: What about the thickness of the ridge? The rafter lengths as given in these tables are to a line in centre of building, and wherever a rafter abuts on a level ridge the rafter must be shortened by half the thickness of the ridge. If the ridge is of 1½-inch stuff, measure square back ¾ inch from the plumb cut (see Fig. 26). This shortening does not apply to hips or creeper rafters.

LENGTH OF RIDGE.

Having determined the length of the common rafters, the next step is to find the length of ridge. By this method the length of ridge is the difference between the length and breadth of building, plus the thickness of itself. Our building being 24 feet long by 16 feet broad, the difference is of course 8 feet, to which add 1½ inches which is the thickness of the ridge, giving an overall lengh of 8 feet 1½ inches. This will allow any common rafter to be used as a jack rafter.

LENGTH OF HIPS.

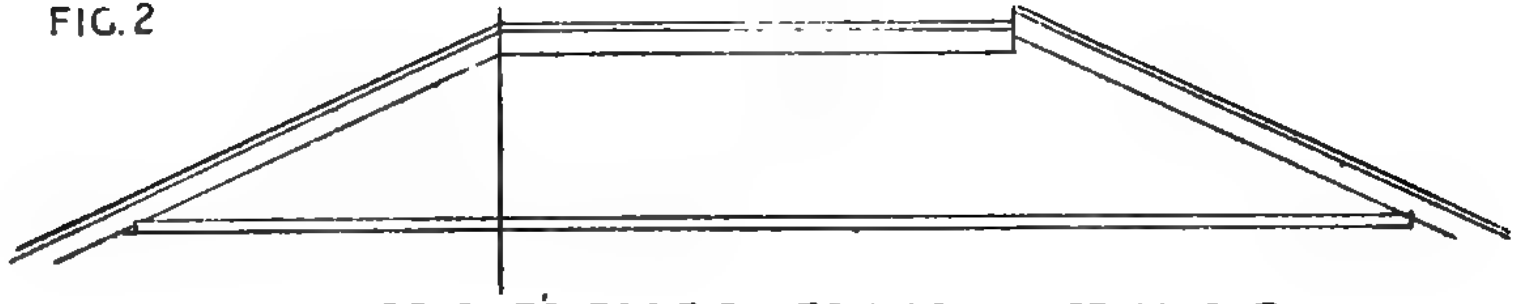
Consult rafter tables for ¾ pitch under the Hip and Valley Table. Opposite 8 feet in the

half span column the figures are 12 feet 9.92 inches, or as near as can be measured 12 feet 9$\frac{15}{16}$ inches from centre line to corner of wall plate. See direction for cutting Fig. 2.

LENGTH OF CREEPER RAFTERS.

It will be seen from the rafter table ($\frac{3}{8}$ Pitch) that the rafter length for 1 foot run is 15 inches and the spacing shown is 1 foot centre to centre, or as some builders say "in to over," and the shortening for creepers to come down the hip is in all cases the rafter length for the spacing specified. Taking this as correct, and it is so, we find the first long creeper has to be shortened by the rafter length for 1 foot, which gives us 15 inches and so down the hips. This means 15 inches deducted from the length of the common rafter as given in the rafter tables irrespective of the ridge allowance, measuring always to long point of side cut on top of rafter, which brings the creeper to its proper position at 1 foot spacing. No shortening for hip creepers is required as for common rafters. The second creeper is 15 inches shorter than the first and so on down the hip, putting each set of offcuts aside. The fourth set of creepers will be the 10-foot piece cut in halves. The fifth set will be the offcut of the third set and so on until every offcut is used up. By these methods there is no waste and the work of cutting creepers is almost halved, as every offcut has the top cut completed and only needs birdsmouth to fit wall plate.

FIG. 2



HIP HELD ABOVE IT'S POSITION TO MARK BOTTOM CUT

QUANTITIES AND LENGTH OF TIMBER FOR RAFTERS.

In ordering material for this roof, the quantity required is the same as for a gable roof with one pair of rafters added for jacks. If this was a gable roof the ridge would extend the full length of the building and jack would not be required. So we order 48/10 for rafters. The reason for this is that the offcut from the first long creeper is the last short creeper on the opposite side of the next hip, meaning that every time you cut a creeper you have the bevel already on the offcut which only needs the bottom cut to complete. When the tradesman has completed cutting the rafters there should not be one piece of timber with a rafter cut left about (see method of cutting creepers, Fig. 3). In this paragraph there is no allowance for overhang, roof being cut off level with the wall.

RAFTER HIP AND PURLIN CUTS.

On the page of rafter tables dealing with this pitch, the angle of every cut is shown. The method is to take a piece of 4-inch timber or set out 4 inches on a piece of wider stuff, square across it at any point and from the square mark set off the distances as given on the table, draw diagonals and take off with a bevel as per Fig. 4, also Fig. 8 showing template for cutting rafters.

METHOD OF CUTTING CREEPERS

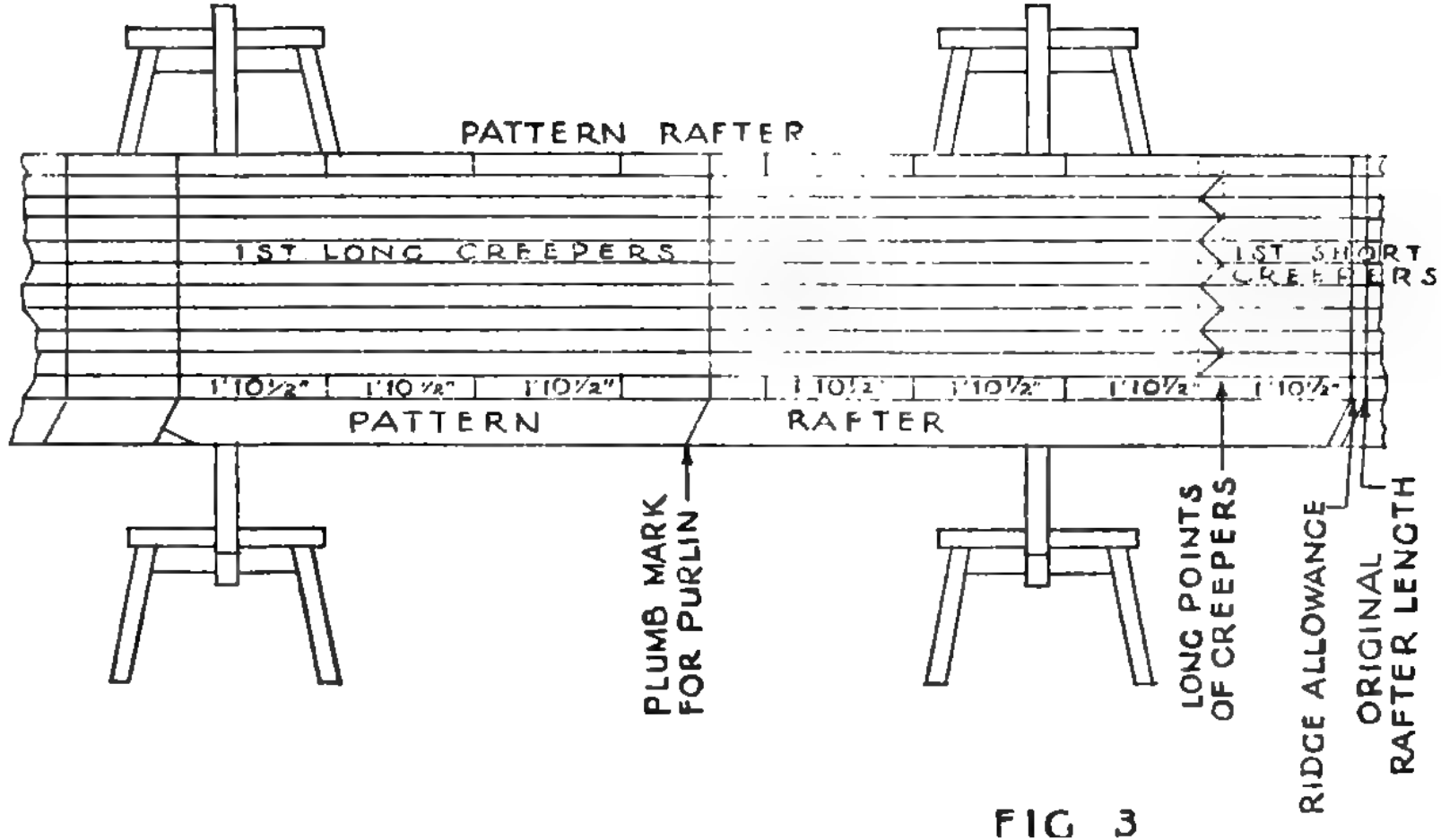
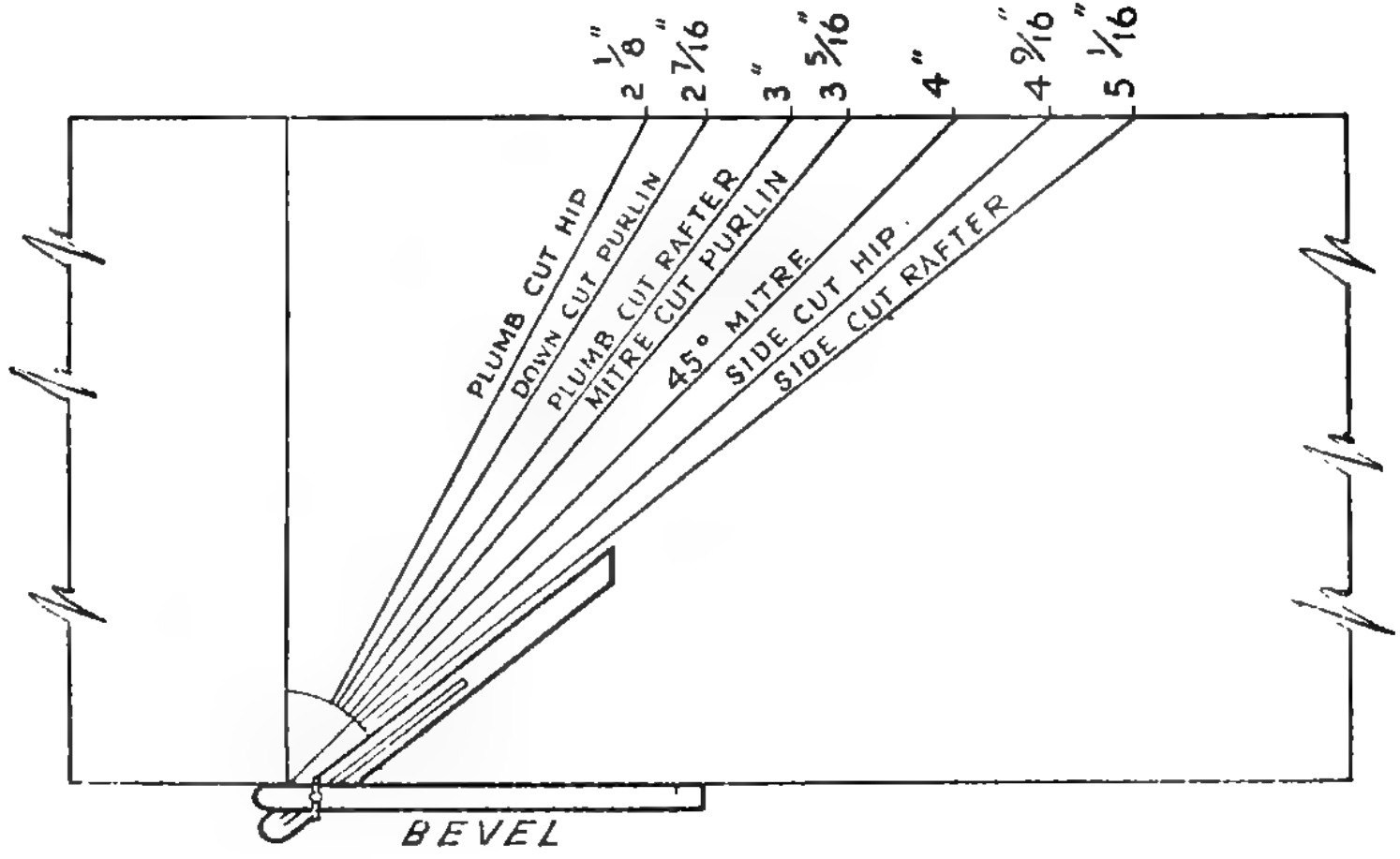


FIG 3

FIG 4 METHOD OF SETTING OUT CUTS



3/8 PITCH 36 DEG.

LENGTH OF PURLIN.

If a purlin is required for this roof, find the length by adding length of wall plate and length of ridge together and divide by two which gives the length of purlin on long side, measured along its centre on top. For the length of end purlin, take half the length of wall plate. Where a purlin returns from hip to valley, the length of the purlin is the length of the wall plate on that side, taking care to reverse the down cut where it intersects at valley rafter.

OVERHANG AT EAVES.

To simplify the figures the writer has purposely not mentioned overhang for eaves. Whatever overhang is required, say 1 foot, then the amount of 15 inches must be added to the length of rafters, or in other words, whatever overhang is wanted the rafter length for that distance must be added to length of rafters. To get a good line for fascia, plumb down each end after and string a line at top and bottom of plumb marks and scribe with rule.

HIPS AND RAFTERS IN SAME PLANE.

To get a good level line along the bottom end of rafters it is necessary that the same amount of timber be left in hip valley and common rafters, which must all be in the same plane. See Fig. 5.

SHAPES OF RAFTERS

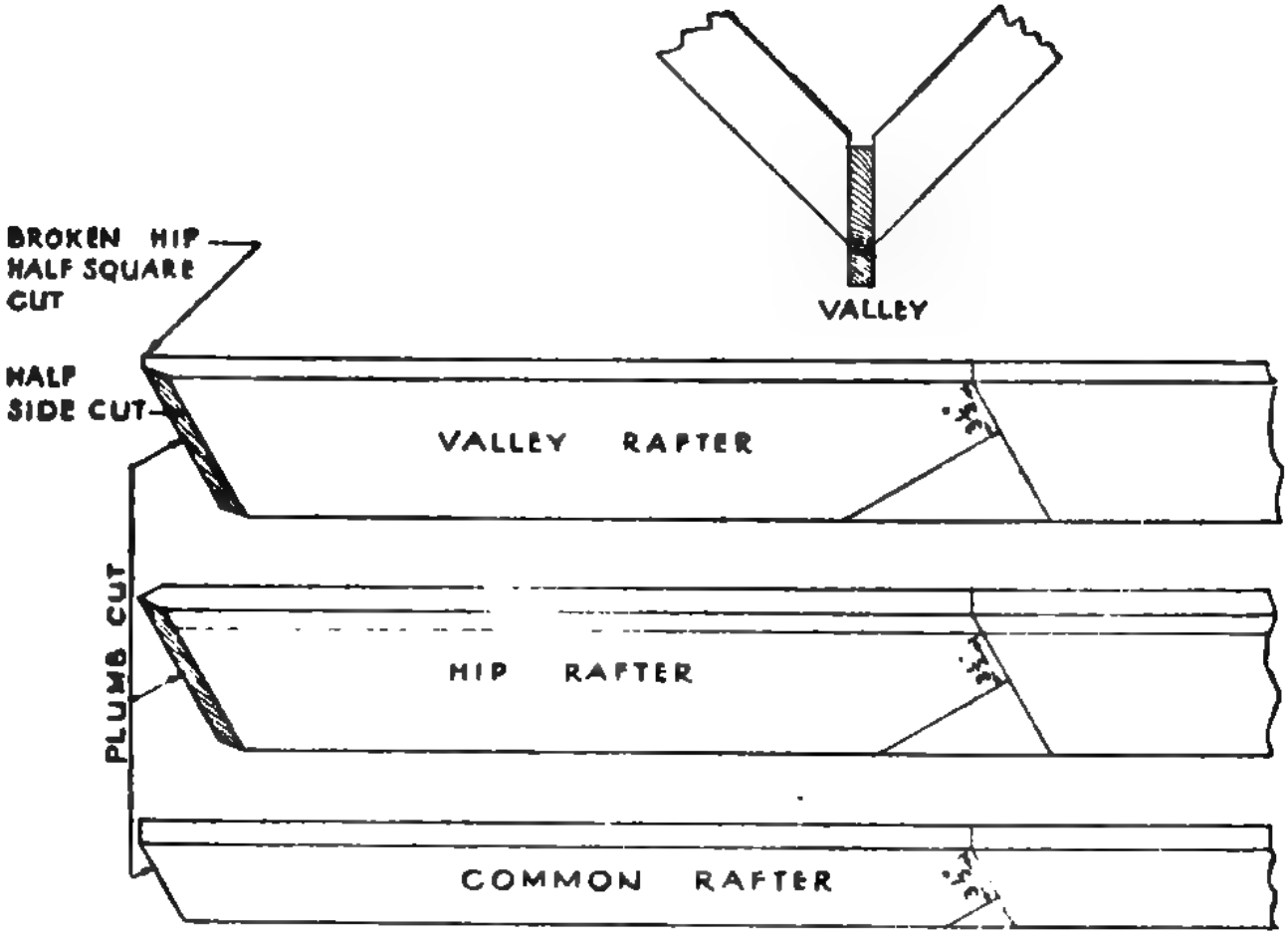


FIG 5.

TACKING RAFTERS.

The writer finds it a good idea to start a 2-inch nail in each rafter while they are lying on the joists, tacking them in position with a 2-inch nail, and going back over them and spiking properly when hip is filled.

MARKING PURLIN CENTRE.

When setting out rafters always put a plumb mark on rafters for centre of purlin. The same thing applies to battens for iron and will save time if this is done on the stools and not left until roof is pitched.

PROPORTIONS OF FIGURES.

The proportions of this roof are: Rise 6 feet, run 8 feet, rafter length 10 feet. Note the same proportion in inches, rise 9 inches, run 12 inches, rafter length 15 inches. These same proportions apply irrespective of width of building.

SELECTING A DEFINITE PITCH.

In setting out the roof of any building. If the plan was drawn by an architect he would specify a definite pitch, and it is definitely necessary for any person doing a roofing job to determine first, what rise he intends to give the roof, taking the rise in 1 foot as a definite proportion. If the rise is known, all the data referring to the job can be found out in two minutes from these tables. For instance,

if a bricklayer building the shaft of a chimney before the rafters were pitched should ask how high is this ridge, and how high he had to go with his shaft, well the building is 24 feet wide and the rise is 9 inches to every foot of run. Twelve times 9 is 108, and the answer 9 feet to top of rafters, he would know at once to what height he would have to go to clear the ridge by the specified amount. The carpenter also knows the length of gable studs without going up to measure them, as the roof rises 9 inches in every foot, so do the studs alter in the same proportion. If the studs were spaced 1 foot apart they would be 9 inches shorter each one, or if the spacing was 18 inches then the shortening would be 9 and the half of 9, making each stud 13½ inches shorter each time. He would also know that the plumb cut of rafter is the angle of 4 x 3, and if he wanted an odd rafter for trimming he would know the length as well as the cut. The plumber also can make his chimney gutters by knowing that the plumb cut is the angle of 4 x 3 for this roof, as the back of his gutter is the same bevel as the plumb cut of rafter. In estimating the number of tiles required for this particular job, if the pitch is known, the tiler will know what amount the rafter gains in the rise of the roof, as the rafter gains 3 inches to every foot in this pitch, and the run is 8 feet. Eight times 3 is 24, so the rafter gains 2 feet in the run of 8 feet, making the rafter 10 feet. The rafter length multiplied by the

CUTS FOR 3/8" PITCH 38°

length of roof will give the number of roofing squares for this particular job, and the number of tiles to the square multiplied by the number of squares will give the required quantity of tiles. A square equals 100 square feet.

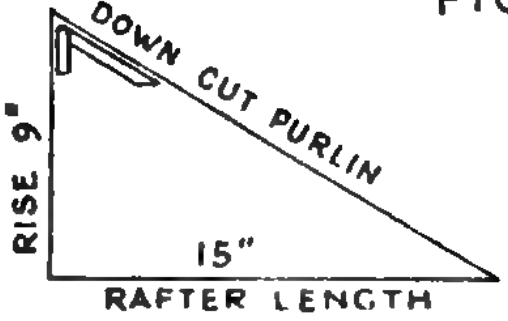
RAFTER CUTS.

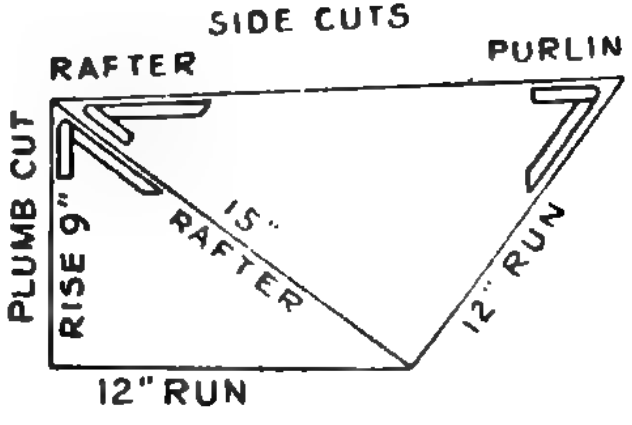
The method used in laying out these rafter hip and purlin cuts is shown in Fig. 6. For the common rafter and creeper cuts, draw right angle having the run on one side and the rise per foot on the other, being 9 inches rise and 12 inches run. A diagonal drawn from 9 inches to 12 inches will be the rafter length, 15 inches. The plumb cut will be found at 9 inches top corner, and bottom cut at 12 inches at bottom corner. At 90 degrees or square off 12 inches draw line to 12 inches equal to run from that 12-inch draw diagonal back to 9-inch rise. The side cut for creepers is found at the 9-inch corner and the side cut for purlin is found at the 12-inch corner. This purlin cut is in all cases square off rafter side cut.

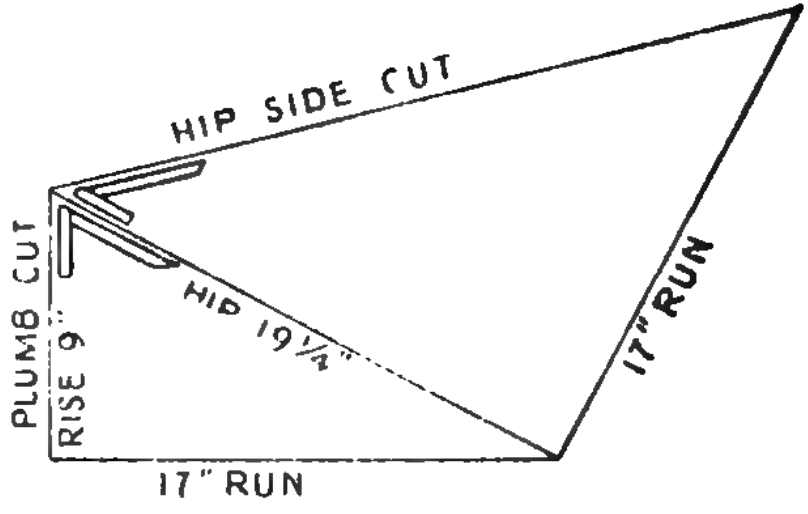
HIP CUTS.

To secure the plumb and side cuts for hip or valley, set out another right angle having the rise 9 inches on the upright side and the run of hip 17 inches on the other. A diagonal drawn from 9 inches to 17 inches will be the hip length, 19¼ inches. The plumb cut is found at the 9-inch corner and the bottom cut at the long corner. For the side cut, square off

FIG. 6







CUTS FOR 3/8" PITCH 38°

the hip line, draw line equal to 17 inches run. From this 17 inches draw diagonal back to rise 9 inches. The side cut for hips is in the 9-inch corner. Fig. 6.

PURLIN DOWN CUTS.

Draw right angle having rise 9 inches on upright side, and rafter length 15 inches on the other. Draw diagonal from 9 inches to 15 inches and the cut is found at the 9-inch corner. Fig. 6.

RUN OF HIP.

The reason that 17 inches is taken as the run of the hip is that the hip represents the diagonal of a 12 x 12 square, and the diagonal of 12 x 12 is 17 (practically), then the run of the hip is 17 inches. These drawings are the same for every pitch by altering the rise figures. The rule for these cuts is the rise and run on two sides of a right angle, and a diagonal from the two points gives plumb and bottom cuts and rafter length. A right angle with the run on one side and rafter length on the other and a diagonal drawn between these points gives the side cut of rafter on the long side, and the side cut of purlin on the short side. These two side cuts are related in all pitches. As the rafter side gets longer, the purlin side cut gets shorter. In other words, one is square with the other. For the hip cut the rise and run are again used, but instead of 12 inches the run is 17 inches. With the rise on one side of the angle and run on the

other, a diagonal drawn from rise to 17-inch run will give top and bottom cut, also hip length. Another right angle with the hip line on one side and its run on the other, a diagonal between the two points will give the side cut for hip on the long side. For the down cut for the purlin take the rise on one side of the right angle and the rafter length on the other. A diagonal from rise to rafter length will give the cut in the rise corner.

CUTTING HIP LENGTHS BY FIGURES.

The finding of correct hip lengths by figures is inclined to be a bit troublesome. The writer would like to say right here that there is no theory that will work satisfactorily short of measuring from ridge to corner, or holding hip in position with the top cut ready and marking bottom cut when in position. The reasons for making this statement are many. In the first place, if the building is out of square at all the figures will not apply. Secondly, any inequalities in the wall plates will alter the run. And any discrepancy in the length of the rafters, however, slight, will lower or raise the ridge appreciably. This difference will not be noticed in the fit of the rafters but you have two immovable points to fit the hip to. Your figures give the distance between these points as, say, 16 feet when in reality they are 16 feet ½ inch; the hip will definitely drop below its proper seat, and must be recut at bottom or packed at top. For

these reasons the writer advocates cutting the hip as at Fig. 2. If the birdsmouth has to be cut to a depth of 2 inches, then hold the hip 2 inches higher than its proper position and mark corner. When cut to fit plate it will then drop where it belongs. The writer has read some very comprehensive books on roofing with the steel square, by clever writers, who without exception advocate setting up the square with rise on one arm and 17-inch run on the other arm, setting the fence to these two figures and sliding the square along the hip as many times as there are feet in the run. Following out my argument that none of these methods will work correctly. The correct run of a hip, instead of 17 inches is 16.97 inches, a difference in one foot of 3/100 of an inch. By sliding the square 16 times along the hip, this difference is multiplied 16 times, giving a total of 48/100, practically half an inch. By any man's reckoning this hip would be ½ inch too long, and would have to be recut. On looking up this fact I cannot find any allowance being made for this difference. In one foot this difference would not be noticed, but when multiplied so many times it is appreciable. This is not written in any spirit of criticism as the writer has read all these books and has learned much from each. But the writer has been referred to so many times about these small points, and has watched their development on so many jobs, that actual roofing has become a hobby with him. In fact, he has often been referred to as a "roofing crank."

MEASUREMENTS.

The writer always advocates that in setting out a building or roof, that all measuring be done by a steel tape, and that the one tape be used all the time. The reason for this is that very few tapes correspond, and fewer still correspond with a carpenter's rule. If a tape is a trifle long, which is so in most cases, any work set out by this tape will be slightly oversize, and the overhead work if set out with the same tape will have the same error, but will correspond, i.e., the roof with the frame. A case in point: The writer was passing a job in a Melbourne suburb, and was called in to check over the builder's roofing figures. On going over his figures they were found to be quite correct, although his rafters, being too short, were hanging on the top points. After discussing all angles of the matter the writer asked with what means was the job set out. "With a steel tape," was the prompt response. "And how did you measure the rafters?" "With a three-foot rule," was the reply. On production of the tape and comparing it with a rule of the same make, the tape was found to be $\frac{3}{16}$ inch longer in 3 feet than the rule, making a difference in the 18-foot rafter of 18/16 or $1\frac{1}{8}$ inches. What would have happened if you had measured your rafters with the tape instead of the rule? The builder admitted that had the $1\frac{1}{8}$ inches been added to the rafter length it would have been a perfect job. And so another little trouble was cleared up. The writer

would like to point out at this stage that it is only the attention given to these small details that make for efficiency as a roof hand, for by whatever method the roof is set out—and the methods are many—the actual amount of work to be done is the same. The total of man-hours that is lost by uncertainty in roofing amounts to a huge sum, and why this is so passes all understanding. Take a youth in his second year as a carpenter. If given a job to frame a hip roof on the level, in most cases he would make a creditable job of it, but the same job if given a rise puzzles quite a number of men who have been half a life-time at it. Admitting that the big majority of carpenters do a good job of roofing and can reason out the imaginary difficulties, the time taken to do this is too long in these days of high wages and keen competition. The writer knows of carpenters who have been with big firms for periods up to fifteen years and have not set out a roof. The reason for this is that these contractors have had so many mistakes made by men who professed to be roof hands, and so much timber spoiled, that they will trust no one to set out a roof for them. So it follows that a big proportion of carpenters that are 100 per cent. proficient otherwise, have no experience in setting out roofing. The writer would like it understood that whatever remarks may appear in these pages, no comparisons of men are intended. Any comparisons that may appear are of methods, not men. It might strengthen my argument to relate an incident that occurred

in the writer's younger days when working as a roof hand from job to job. An advertisement appeared in a Melbourne daily reading thus: "Carpenter wanted. Roof Hand. No Duds. Good Wages." The writer attended with 79 other men for the job. The builder sympathised with the men and the bad times and said: "I want a good man, and how can I pick a man out of this gathering?" However, he asked a few questions regarding his roof, and being a roof expert himself, he was sure when he got the right answers. He singled out the writer and said: "It's your job. What wages do you want?" The writer asked what he paid the other men. He said: "I never pay less than the award, 21/8. If a man is not worth more than that he is only in our way." We compromised that I should start, and we would talk wages on pay day, if I lasted that long. The builder watched me start, then left me with a free hand. When pay day came I was paid at the rate of 27/6 per day. These incidents show what a help it is to any man who has to work to be able to answer off-hand any question he may be asked about his job. In those days the writer interviewed builders regarding roof work, and has been told: "No vacancies; call again." On mentioning his name would be told: "I have heard of you. When can you start?" If I have laboured this paragraph at all, it is because I am enthusiastic about this business, and if the reader knew what these figures have done for me he would be enthusiastic too.

ESTIMATING ROOF TIMBERS.

To find the number of rafters required for a building, take one side of building in feet—say 40—and half one side—20. Total, 60. Add two for jacks, and 62 rafters are needed for 1 foot 6 inches spacing. For 1 foot 4 inches spacing take one side of building in feet—say 40, and two-thirds of other side—approx. 26—total 66. Add two for jacks, making 68 rafters for 40 feet building, rafter spacing being 1 foot 4 inches.

ESTIMATING TILES.

It should be borne in mind that it does not matter what shape a roof is. Whether it be Hip, Gable, or Lean-to, if of the same pitch all over, the surface to be covered with tiles or any roof covering is the same, and as the cost of each tile is to be considered it does not do to be short of tiles, or to have a quantity left over to lie about the job. So it pays to be fairly accurate in estimating quantities. Find the number of square feet in the roof by multiplying the length of rafter by the length of roof: say rafter length 18 feet, roof length 40 feet. 40 x 18 equals 720. Multiply by 2 equals 1,440, or a total of 1,440 square feet. This number divided by 100 gives 14½ squares approximately. As different tiles vary in size, it is necessary to ascertain from tile manufacturers the number of tiles to one square. If the number is 150 tiles to the square,

then 150 multiplied by 14½ will give the required number, viz., 2,175. In laying tiles, if they are cut with the proper tool the pieces cut off at the hips will come in at the valleys.

RAFTER TABLES.

To make these tables clear, and get a better understanding of them, we will work out a roof of the same pitch on a different sized building, say 36 feet x 24 feet. The half span of this roof is 12 feet. Turn to ⅜ page and under rafter lengths in the half span column find the figure 12. Opposite 12 will be found 15-0-0 which is the exact rafter length less half the thickness of ridge. For the hip and valley column opposite 12 will be found the figures 19-2-88, being the exact length of hip or valley. On the left-hand side of the page will be found the angles of all the cuts required, and in the right-hand corner is given the correct shortening for the creeper rafters coming down the hip for 18-inch spacing. Should any other spacing be required, say 16 inches, then the shortening is the rafter length for 16 inches. Take the first figures in the foot column and the figure opposite 4 in the inch column being 1 foot - 3 inches and 5 inches, making the shortening 1 foot 8 inches. The length of ridge is the difference between the length and breadth of buildings, plus the thickness of itself. 24 feet from 36 feet leaves 12 feet, plus 1½ inches thickness of ridge, then the length of ridge is 12 feet 1½ inches. The rafter length given here would

be right for tiles that cover 13⅞ inches or 14 inches taking 13 rows. The length of purlins on the long side is the length of wall plate and length of ridge added together—36 plus 12 equals 48, and divided by 2 gives the exact length of purlin at centre of rafters and intersecting at centre of hip. The length of the end purlin would be the half length of the wall plate, always measuring along the top of purlin in the centre. This means that the centre of the two side cuts is the length of purlin. Where a purlin returns from hip to valley the length of purlin is the length of wall plate on that side with down cut reversed under valley rafter. It will be noted how the same proportions occur in this roof as at Fig. 1, being 9 feet rise, 12 feet run and 15 feet rafter length. The same sequence as 6-8-10 or 3-4-5. It will be found as with all the figures in this book, that used intelligently they will give definite results without any other aids than are usually found in any carpenter's apron pocket, that is, rule, pencil and square, with the addition of the sliding bevel. See Fig. 7.

RAFTER TEMPLATE.

At Fig. 8 will be found a drawing of the handiest aid to roofing that the writer has ever experienced. It consists of two pieces of wood nailed together, one member having the top and bottom cuts (rafter) and the other member having the right and left side cuts for

FIG 7 ROOF SET OUT BY FIGURES

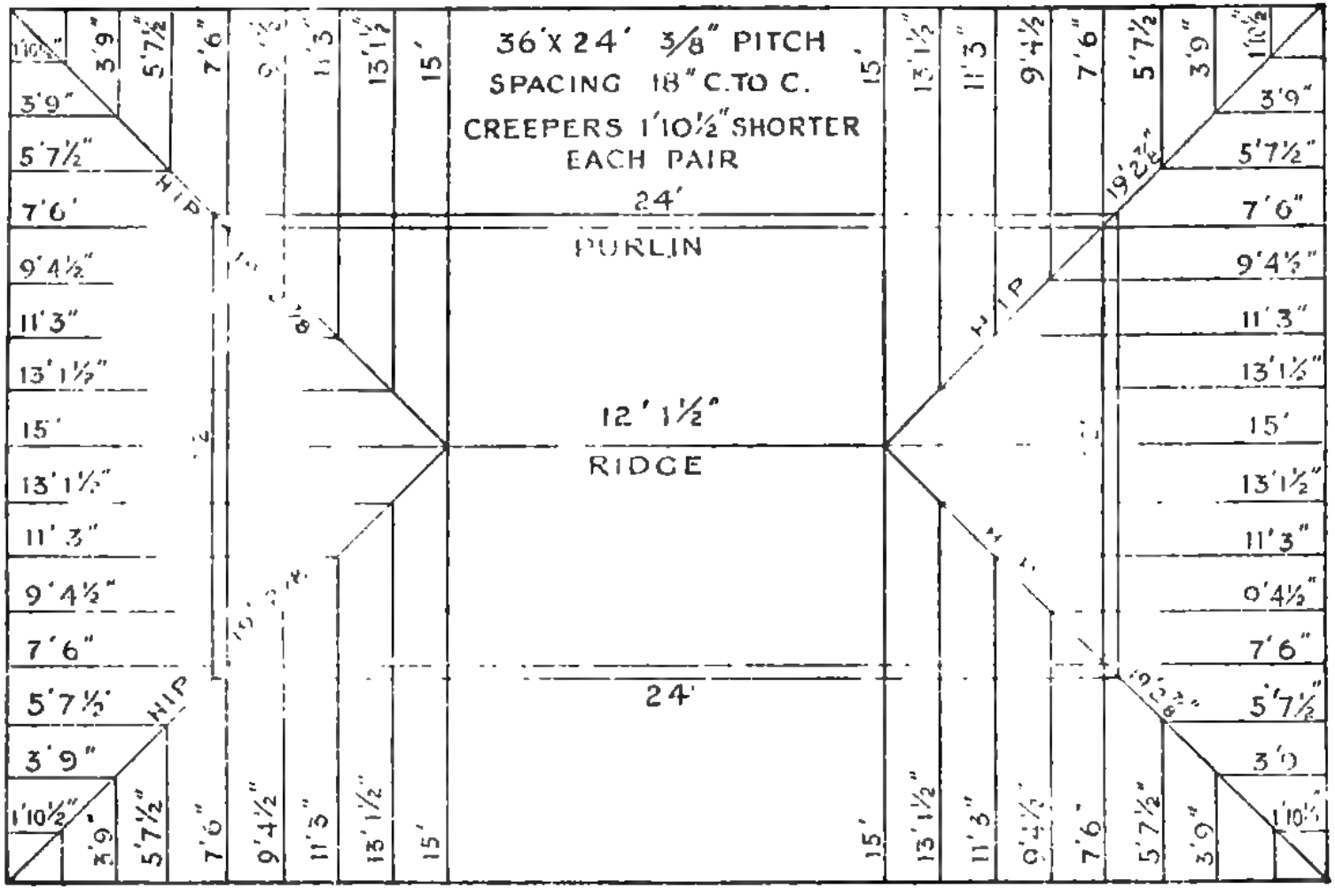
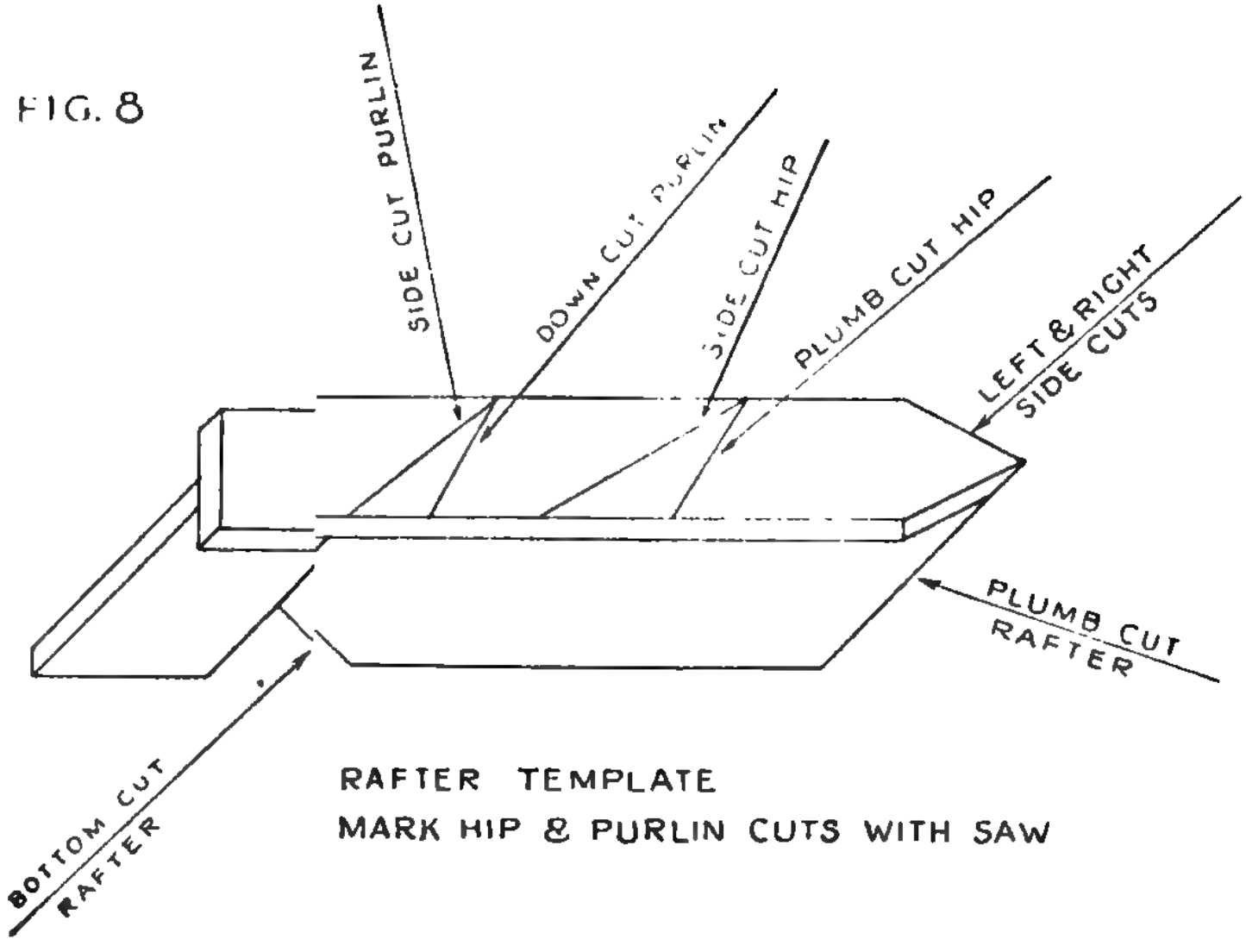


FIG. 8



RAFTER TEMPLATE

MARK HIP & PURLIN CUTS WITH SAW

creepers. On the back the plumb and side hip cuts, also the down and side cuts for purlins are marked with fine saw cuts. This is used exclusively for marking out rafter, hip and purlin cuts, ensuring in the case of rafters that every rafter has the same cut, and also that the same amount of wood is left in each rafter. The hip and purlin cuts are taken off this gadget with the sliding bevel. The writer does not know by whom or when this gadget was "invented," but whoever the inventor was, he has my congratulations for a handy job. If this tool is made substantially, it can be saved for future use by putting it away in the workshop, and gradually a collection will be acquired, making it possible to pick out any one when required. The writer has repeatedly had these gadgets stolen by workmates who considered them the whole secret of roofing, but who would have found them worthless without the correct figures to use in conjunction with it.

THE PURLIN SIDE CUT

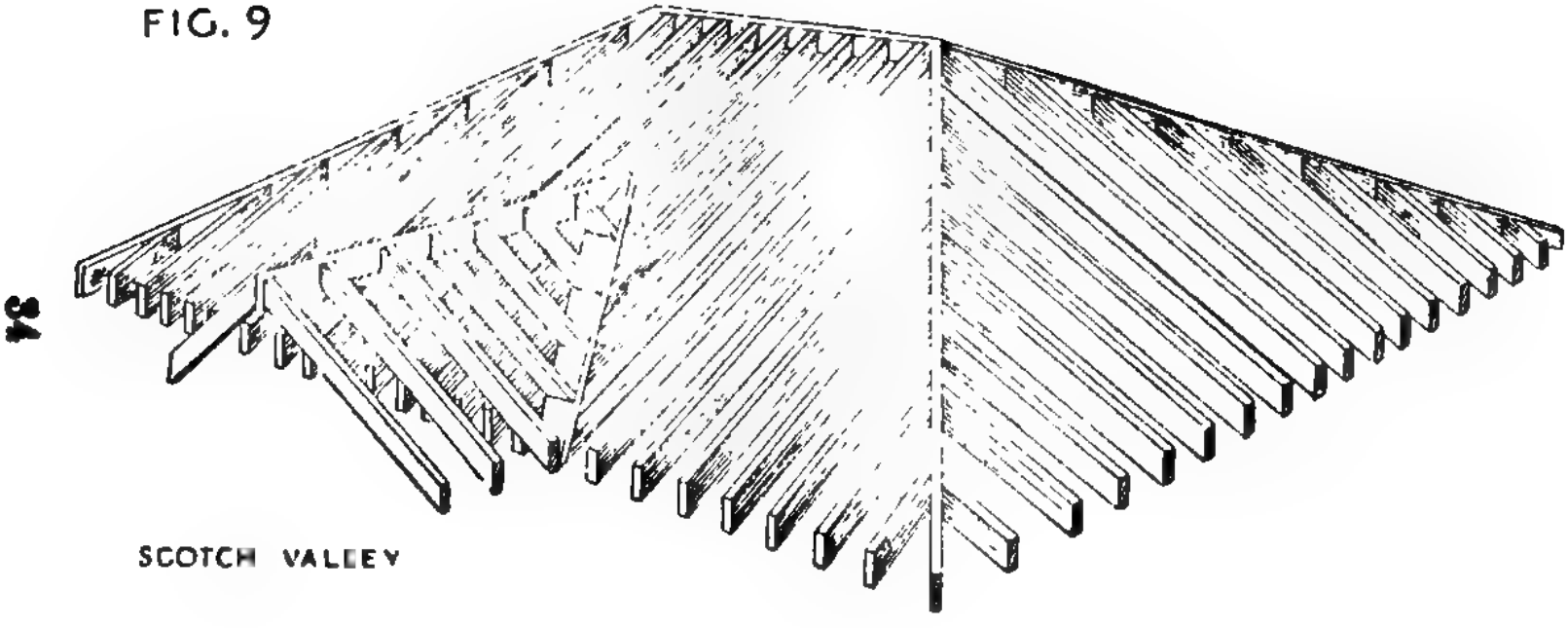
This cut does not receive the consideration it deserves, as in roofing it is used in various places besides the purlin. It is used on the battens to fit the hips on an iron roof. It is also the cut for returning lining for eaves, either under or over the hip, as well as being the cut for lining a cove ceiling that returns on a hip. An instance comes to mind of a carpenter who was sent to put up a cove ceiling with 8 x 4 sheets. This man knew it all,

but while waiting for help to erect the sheets he busied himself by cutting all the material required for the returns with the mitre or 45-degree cut, instead of the purlin cut, and he still considers that the hips were in the wrong position. Another instance was of two carpenters lining the underside of eaves, with 4-inch lining, the overhang being 2 feet wide. The writer was working on the roof, and listened in to the ensuing debate. "Hey, Bill, these flaming cuts of yours are no good." "What's wrong with them?" was Bill's comeback. "Well, they don't fit by a mile," his mate replied. Bill said: "I put a mitre cut on, and it must fit. It's a right angle isn't it." At this stage Bill hailed me: "Hey, mate, you have got these hips in wrong." Of course the writer was properly indignant, although highly amused, and asked mildly, "How long have you chaps been at the job?" "A lot longer than you," was the reply, "if this is what you call a good job." However they agreed with me that if the roof was level the 45-degree cut would have been right, and when I set my bevel to the purlin side cut and handed it down to them they were highly interested and satisfied, and cordial relations were established again. These incidents find a place in this book only because they tend to show what can happen that the necessary knowledge will obviate. Both purlin cuts are used extensively in hopper building, and it is easy to remember the side cut as it is in all pitches at right angles to the side cut of the rafter.

SCOTCH VALLEY.

At Fig. 9 the writer has imposed a small hip on a larger one, to show the difference between the weight carrying capacity of a Scotch valley as compared with a valley rafter in the orthodox position. In the Scotch valley, although it takes a slightly larger amount of timber, it will carry three times the weight that the valley rafter will. In the case of the valley rafter on edge, the rafter is fastened at the top for about half its depth, and is cut away at the bottom to the dimensions of the seat of the common rafter, and every rafter that abuts on the valley is hanging on nails. The strength of the valley rafter is only the strength of its smallest part. In the case of the Scotch rafter the whole weight of the valley rests solidly on the rafters of the main roof, which in turn are carried on the purlin. Of course in some cases there is no wall to carry these main rafters to, and in that case the valley rafters must be used. The method of putting in the Scotch valley is to determine the centre line of valley, and place the timber that carries the rafters slightly lower on top of main roof. A line strung from ridge to centre of valley will determine the position of this carrying rafter. It should be low enough to allow the tops of the rafters to intersect the centre line of valley. The same side cut is used, and the horizontal cut as if it fitted the wall plate.

FIG. 9



SCOTCH VALLEY

PUTTING HEAVY RIDGE IN POSITION.

A method at Fig 10 is shown of getting a heavy ridge into position. First nail two cleats at each end of ridge to rest on ends of rafters. Put one pair of rafters up and brace temporarily, then put the other pair of rafters up with nail in each driven ¼ inch through the rafters. Hoist one end of ridge through this free pair of rafters, with one end of ridge resting on joists, then if a batten is nailed on ridge as a lifting medium the ridge can be hoisted by this batten while the braced pair of rafters are held open to receive the ridge. By starting a nail in each rafter they can be driven into safety at the extreme reach of a man standing on the joists.

PITCHING HIGH RIDGE WITH NO WALL PLATE.

It will be found that in a large residence there might be up to four or five ridges at different levels, and it is necessary to impose one roof on the rafters of another lower one, or there may be no wall plate, at one section to rest the main rafters on. In this case set out the true pitching point, or the point where the plate should be, and set out a parallel line 12 inches inside that line. Assuming the joists are of 4-inch stuff, pack up on top of joists another 5 inches, making run 12 inches and rise 9 inches, and cut a birdsmouth on a rafter 15 inches shorter than its mate, to fit this packing. This will bring the ridge to its

PUTTING HIGH RIDGE IN POSITION

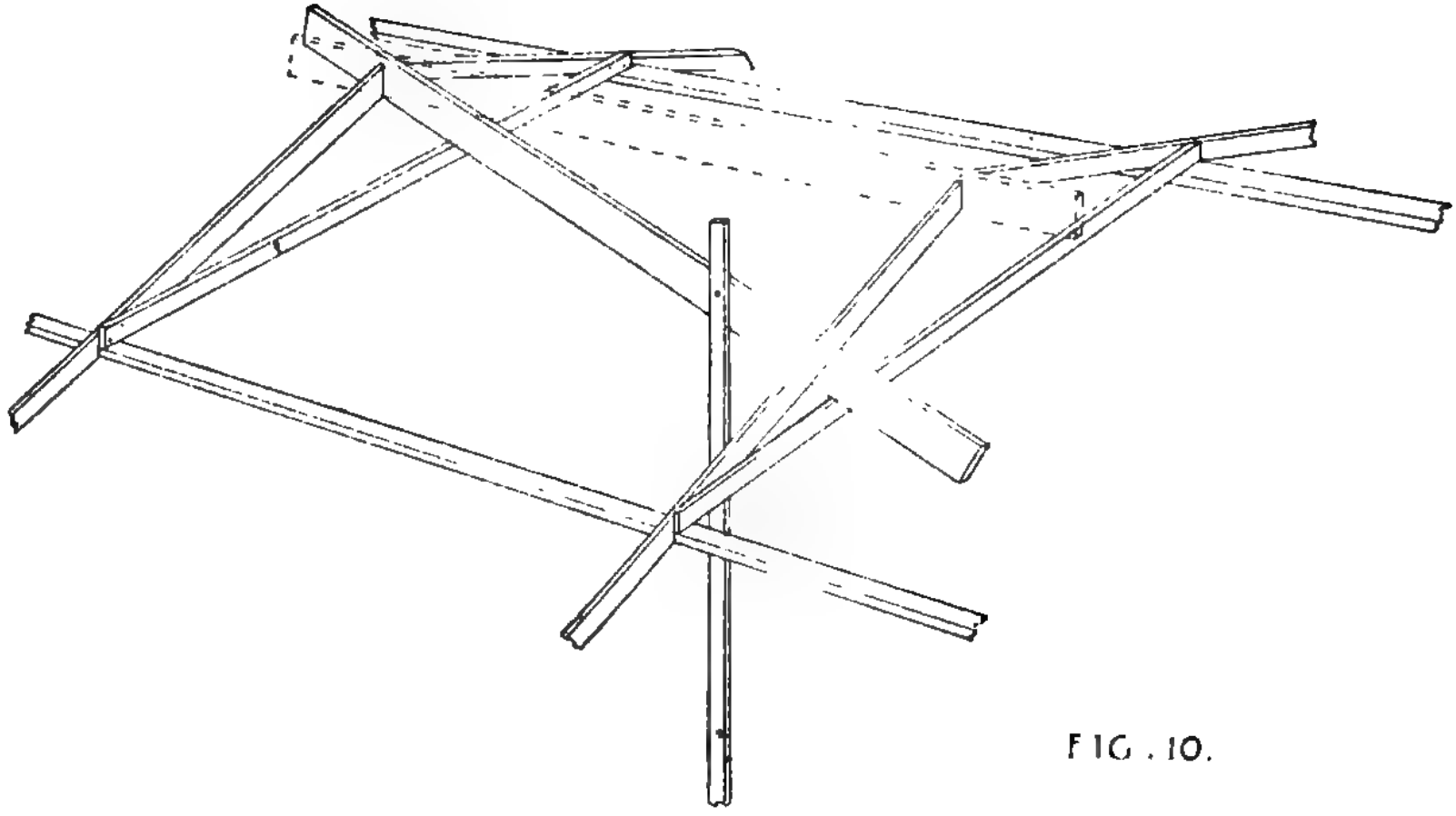


FIG. 10.

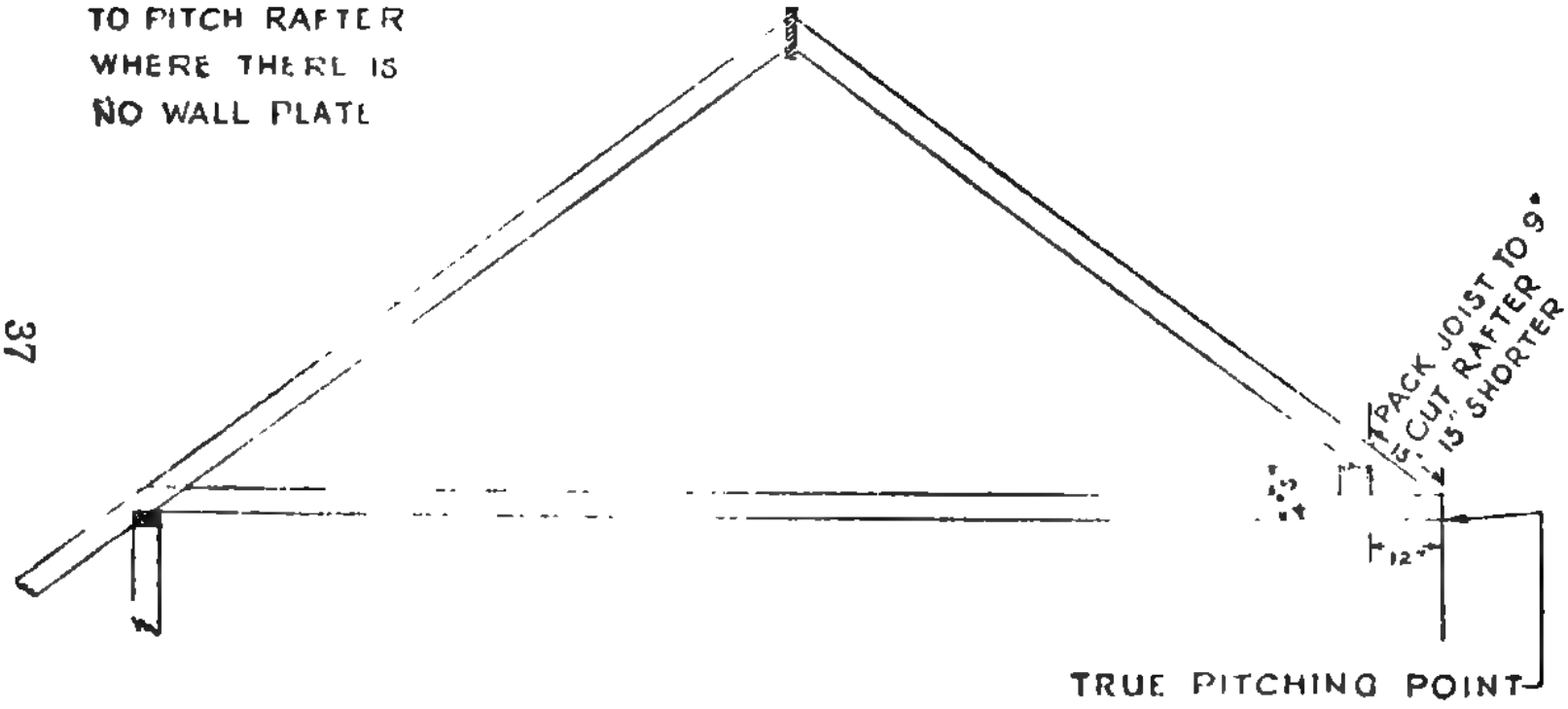

TO PITCH RAFTER
WHERE THERE IS
NO WALL PLATE
PACK JOIST TO 9"
& CUT RAFTER
IS SHORTER
12"
TRUE PITCHING POINT

FIG. 11.

proper position. This short rafter can be cut out when ridge is secured, or if this rafter comes in the way of a valley rafter it can be secured in position and cut through to fit the valley. In a roof of this kind it is more satisfactory to pitch the high ridge first, always remembering that the figures used in these chapters are for a ⅜ pitch. If working on any other pitch use the figures that belong to that pitch. The methods are the same. Fig. 11.

WHEN TO SET OUT ROOF.

A fair amount of time can be saved in setting out a roof if the setting out is done when the plates are tacked on the bottom joists in readiness for setting out studs. It is the practice in a good many cases to try to make a good showing with the framing, a lot of trimming being left and the framing completed, and the setting out of top joists and rafters left till the frame is up, then this work is done off ladders, when it can be done in one quarter of the time while the plates are at foundation level. It is the rule in Australian roofing that every rafter be fastened to the end of the corresponding joist, as well as the wall plate. So it becomes necessary to set out the main and jack rafters, first marking their seats with two saw cuts, and setting out the joists from those points, one man setting out on each side and each checking the other's spacing. If this is done correctly it is not necessary to use a rule to

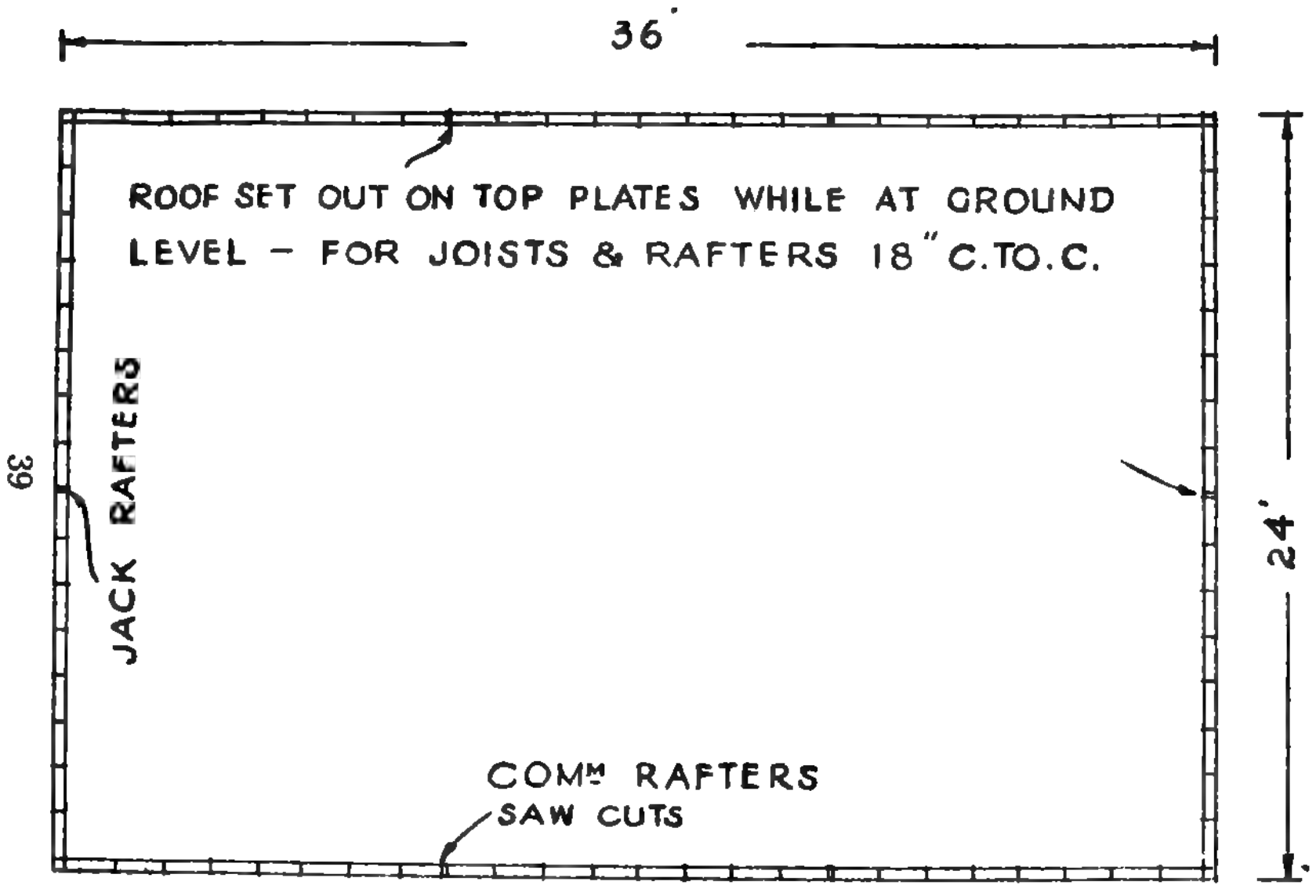

36'
ROOF SET OUT ON TOP PLATES WHILE AT GROUND LEVEL - FOR JOISTS & RAFTERS 18" C.TO.C.
JACK RAFTERS
39
24'
COMM RAFTERS
SAW CUTS

FIG. 12.

complete the top hamper, as each joist is nailed on its own mark, and each rafter is fastened to the joist, thus making sure that each rafter is parallel with the others. By the main rafters the writer means the rafters at each end of the ridge and the jack rafter, or the rafters that are used to get the ridge in position. Fig. 12.

NAMES FOR RAFTERS.

As the words "Creeper" and "Jack" occur so many times in these pages it might be as well at this stage to classify these rafters. In Australian roofing a jack rafter is one that abuts at the end of a ridge, and all rafters that abut on the hips are called creepers. While the English and American practice is to call all these rafters jack rafters. As this book is essentially Australian we will adhere to our own trade names, and call them jacks and creepers.

STRAIGHTENING HIPS.

Much unnecessary work is done in putting temporary stays on hips to keep them straight while nailing rafters, when in less time one or two pairs of rafters can be put up and tacked for straightening; these rafters when the hip is pushed into a straight line will be in their proper positions, making one job out of two. It is advisable with long hips to put a temporary prop under each to take up the sag in the hip, a deep thin hip being better

than a thick one, for the reason that a hip carries no weight, its only purpose being to keep the rafters spaced and in position.

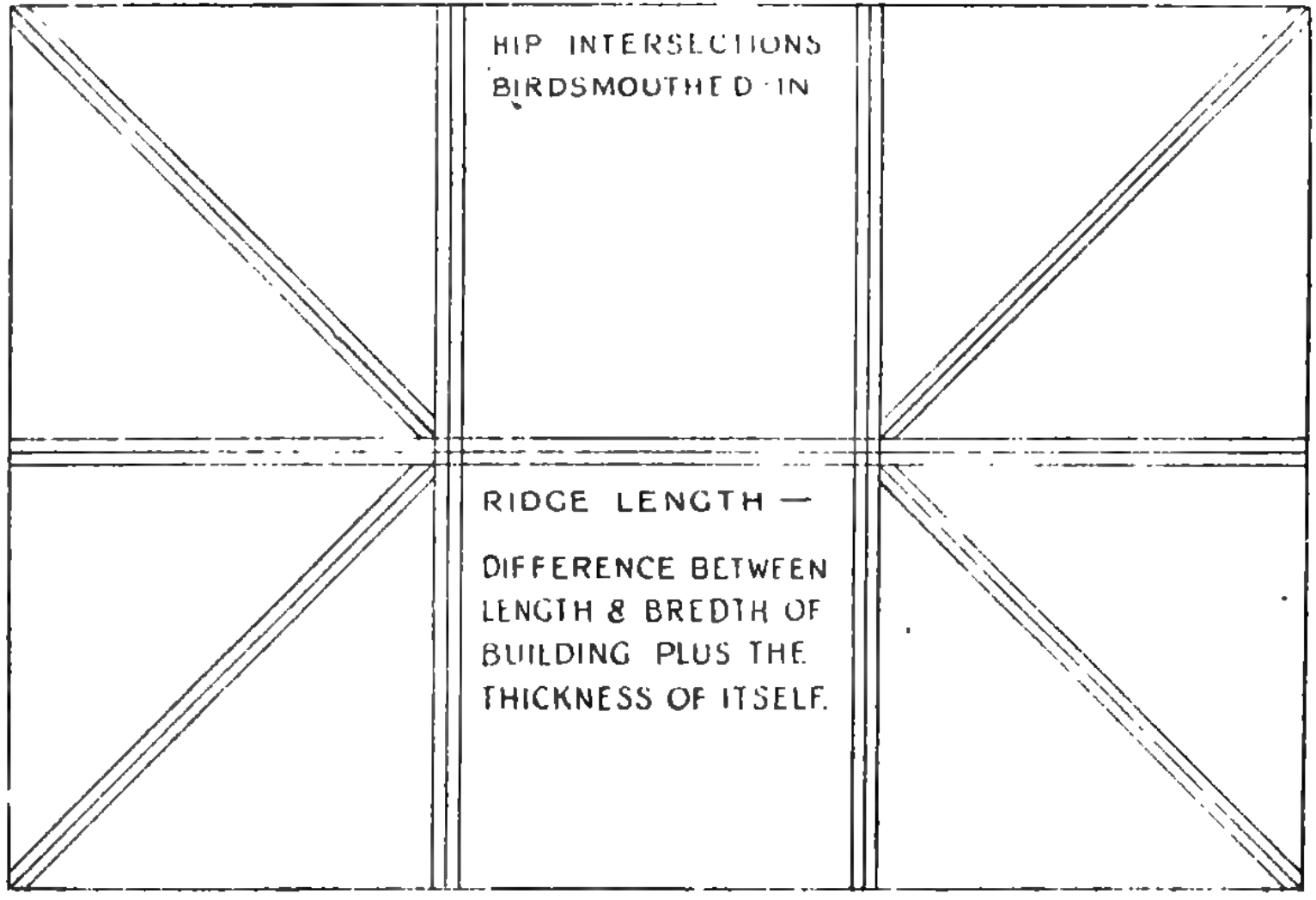
INTERSECTIONS.

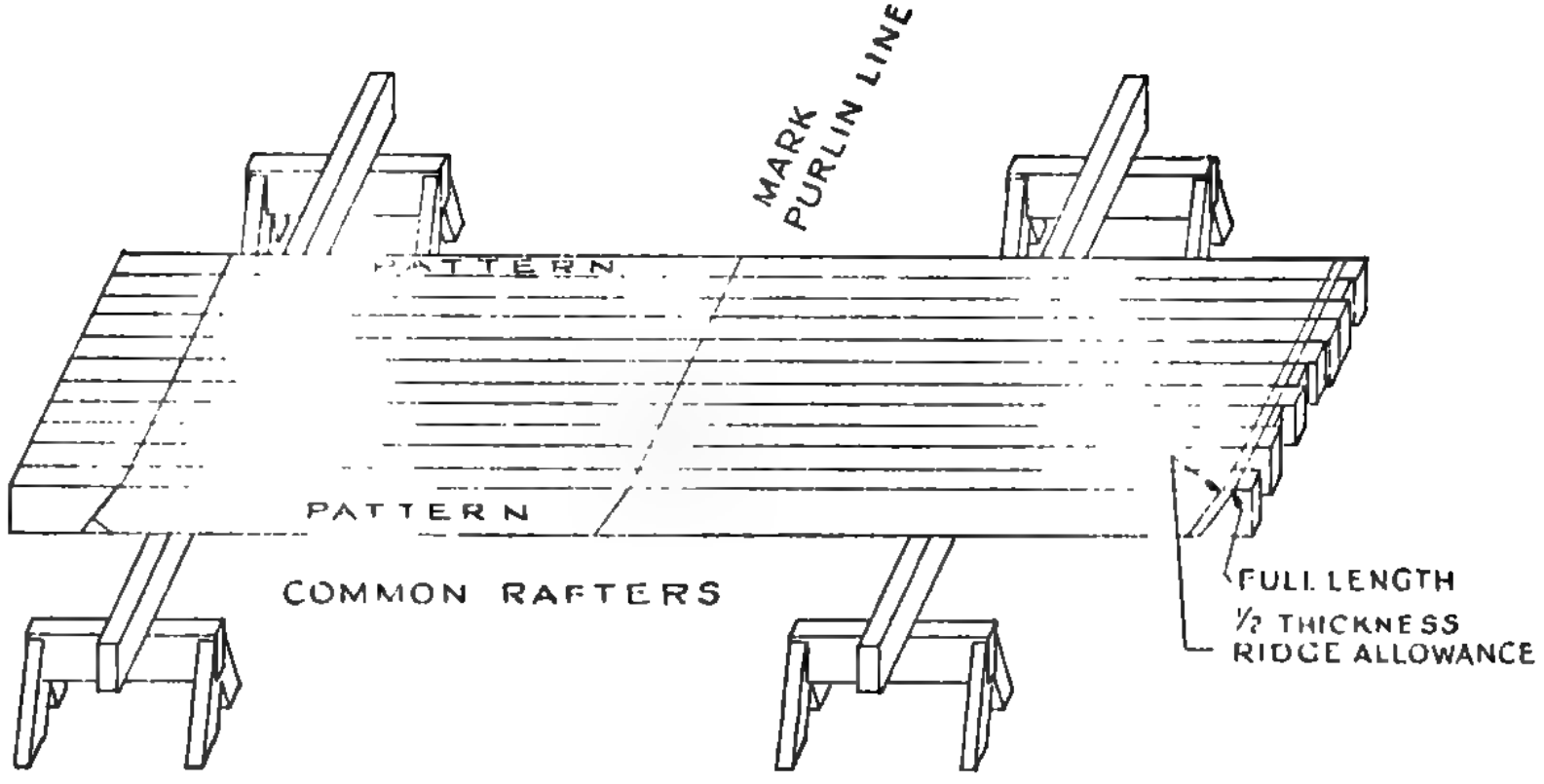
Fig. 13 shows the method we use for fitting the top of hip to ridge. This is a very old method, and much stronger than the method used by a number of builders to-day. The old method locks the hip tightly in a right angle or birdsmouth between two rafters. The other method used is to let the end rafters stand back from the end of ridge, and nail the hip on the side of ridge, using only one side cut. The old method uses two side cuts.

METHOD OF CUTTING RAFTERS.

Fig. 14 shows a method of cutting rafters. Instead of using two saw stools, it is far better to use four stools with a 4 x 3 across each, making a trestle or platform which gives the carpenter some room to work. Our method is to make this platform wide enough to take two sets of eight creeper rafters, allowing one man to set out and one or two men to cut. For common rafters set out two patterns, place one on each side of eight others, square across at plumb cut and birdsmouth and mark square across for purlin centre, then marking cuts with rafter template. These two pattern rafters can be marked out with each set of creeper lengths, and each set of creepers can be marked from these patterns.

FIG 13


HIP INTERSECTIONS
BIRDSMOUTHED IN
RIDGE LENGTH —
DIFFERENCE BETWEEN
LENGTH & BREDTH OF
BUILDING PLUS THE
THICKNESS OF ITSELF.

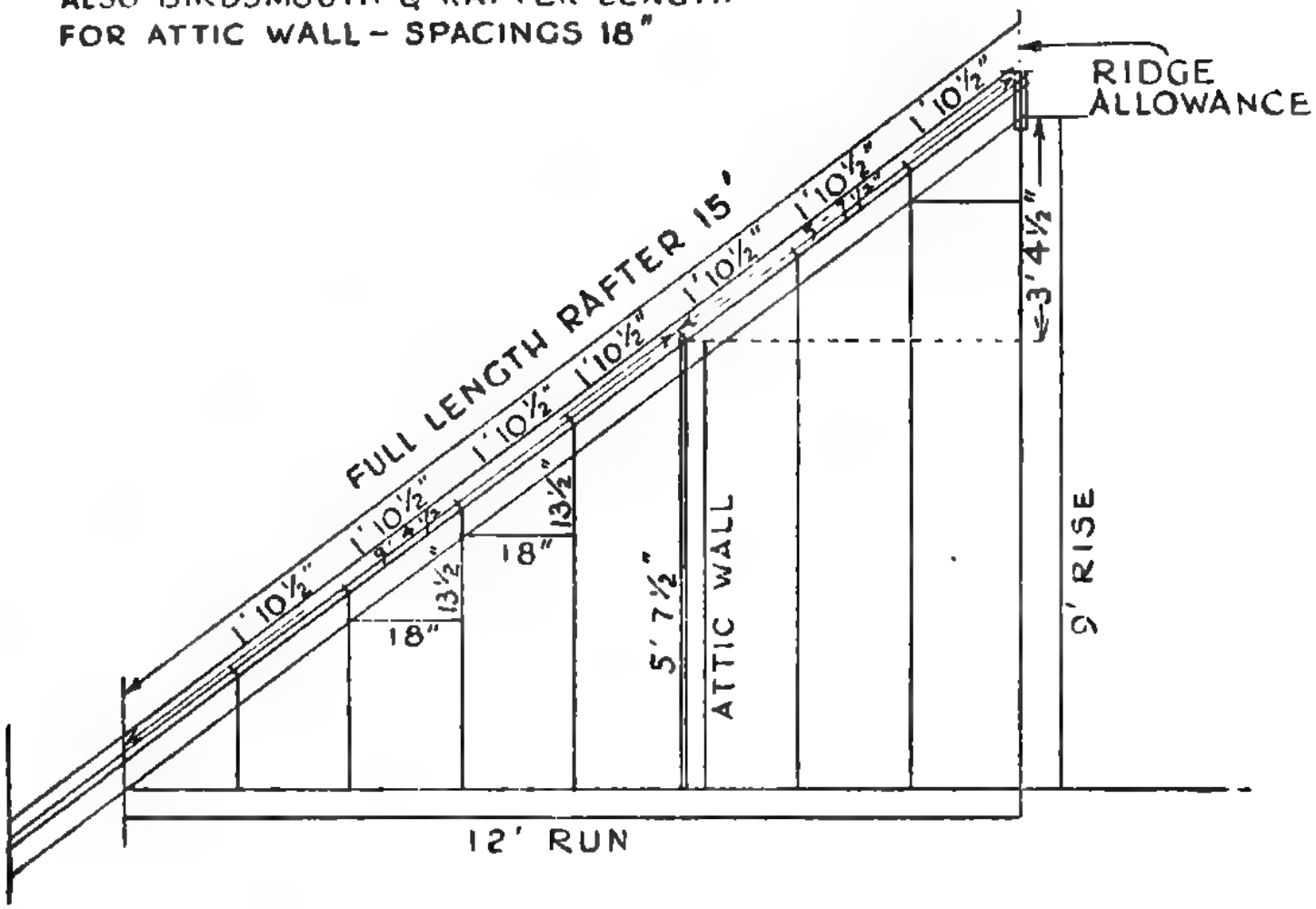


METHOD OF CUTTING RAFTERS

FIG. 14.

FIG. 15

PATTERN RAFTER USED ON GABLE
SHOWING SHORTENING & SPACING OF STUDS;
ALSO BIRDSMOUTH & RAFTER LENGTH
FOR ATTIC WALL – SPACINGS 18"



PATTERN RAFTERS AT GABLE END.

If this were a gable roof and the same spacing were required for gable studs, the creeper marks on the pattern rafters, if marked on the side with a plumb mark, each mark would be the position of the gable stud. Fig. 15.

ATTIC WALLS.

To carpenters who have not been used to attic work, the height of walls sometimes presents a problem, although they are really easy to deal with. Where there are attic walls and it is necessary to pick these walls up with the rafters, these walls in all cases must have the same rise or fall as the roof. If the outside of the low wall was 9 feet from the outside of a wall plate, it must be 9 inches higher for each foot of run. As the distance from outside to outside of plates is 9 feet and the rise of the roof is 9 inches to every foot of run, 9 x 9 equals 81, so the wall must be 6 feet 9 inches high. If another birdsmouth is cut in rafter at the length given for 9 feet measured from the bottom upwards, this birdsmouth would fit the wall. The same principle applies to walls at a lower level than the main wall and the main rafters are to be carried to this lower wall on the same pitch. If a lower wall was to be picked up with a rafter and it was 1 foot away from the main wall, a birdsmouth 15 inches lower down the rafter would fit this wall. By knowing the rafter length for one foot of any pitch, and the rise per foot, this operation is made easy.

CUTS SET OUT ON 4-INCH RAFTER.

Fig. 4 shows all the cuts for this roof taken from the rafter tables and set out on a 4-inch piece of timber, care being taken to see that it is exactly 4 inches, as a little more or less will alter the bevels. Square across at any point and set out as given in the tables. If rafters are not straight and are placed with round side up these cuts will be slightly open at the bottom, but will close as they take the weight.

RAFTER LENGTHS FOR EVERY FOOT.

Fig. 16 shows the rafter length for every foot from 1 inch to 18 inches rise per foot, which equals 1 foot rise to every 12 feet of run.

RAFTER CUTS FOR 1-INCH RISES.

Fig. 17 shows common rafter cuts set out on 4 inches square from 1 inch rise per foot to 12 inches rise per foot.

SHAPE OF RAFTERS.

Fig. 5 shows the shape of the different rafters and the amount of wood left in each rafter.

PROPPING PURLINS.

When propping purlins the foot of props should be fitted to a short plate spread over at least three joists, and not fitted to wall plate. This is to distribute the weight along the plate as much as possible. Very often a prop is placed on the plate close to, or on

RAFTER LENGTHS FOR 1"RISE TO 12"RUN
EQUAL TO 1'RISE TO 12'RUN

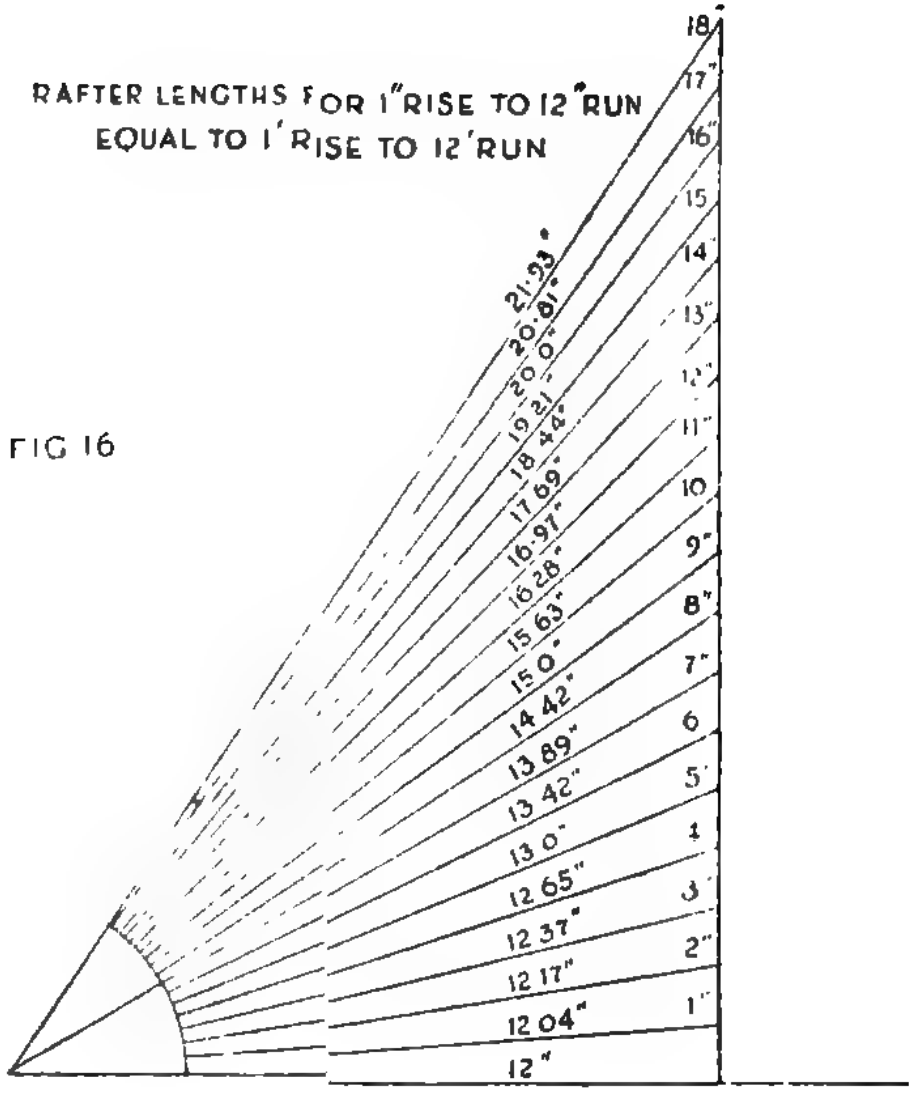
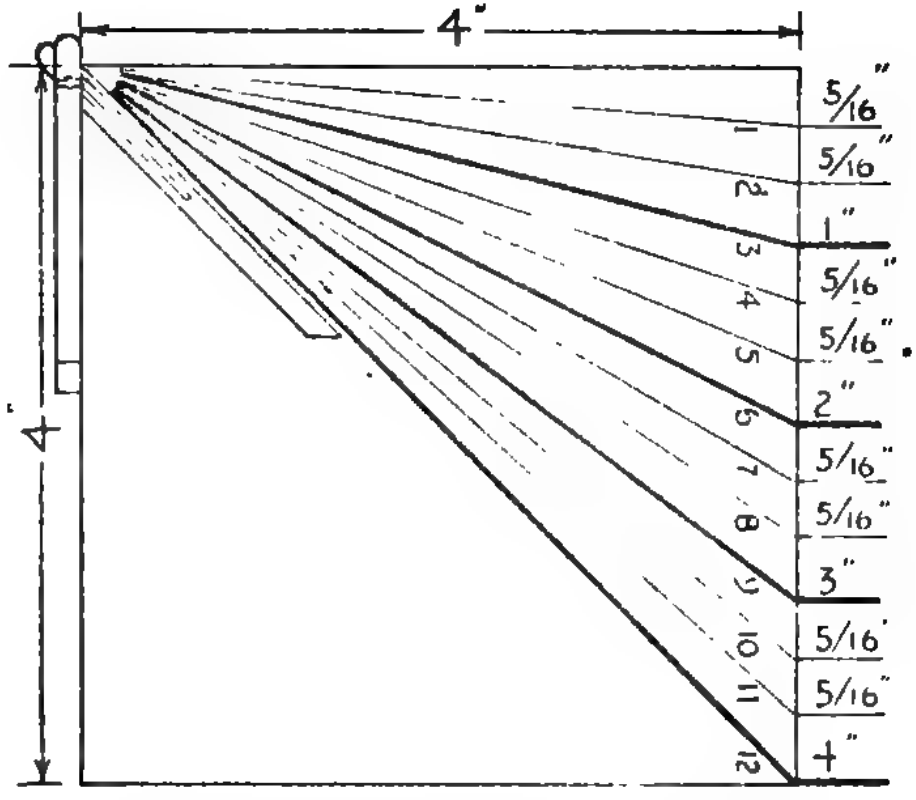


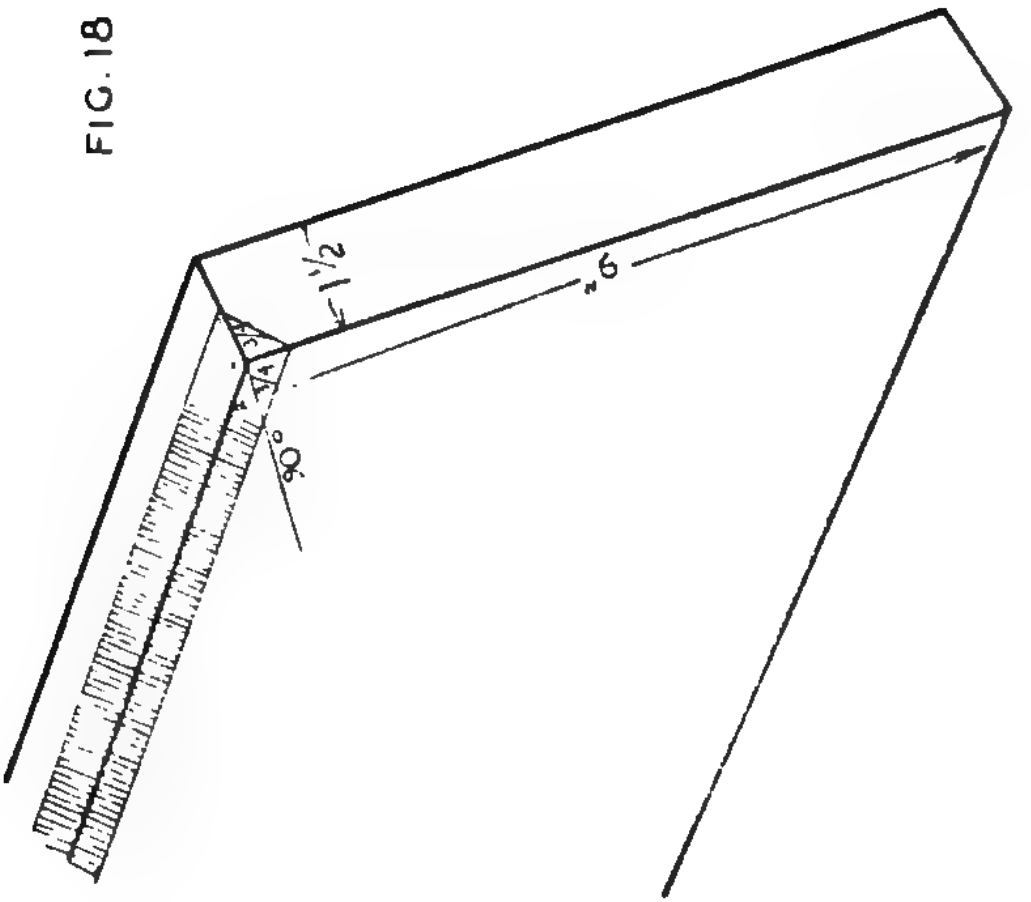
FIG 16

FIG. 17



COMMON RAFTER PLUMB CUTS
SET OUT ON 4" SQUARE IN 1" RISES
TO 12" RUN

FIG. 18



top of, a door stud, and the downward thrust will compress and bend the door stud, moving the door jamb out of position, and the neater the door is fitted the more liable it is that the frame will touch the door. While dealing with the question of propping, it might be in order to say something about the relation of the pitch of a roof to the weight. The writer has been called in to report on the question of repairing and repropping various roofs that had sagged badly, and in some cases had split the brick walls and torn the joists apart at the junctions. The reason for this was that the arrangement of the building being composed of large rooms, and the roofs pitched too low to allow a proper system of propping to be used, the whole weight of the roof was pressing down in the middle. On one of these roofs the weight of tiles amounted to 10 tons. If this roof had been pitched steeper, it would have been possible to get props on to the interior walls and break the stresses up into smaller parts, and the collar ties able to do the job for which they were intended. Just as a good horseman will notice the points of every horse that passes him in the street, so will a good roof man notice the lines of the roofs as he passes them. He will notice a nice home here that has sagged in the valleys, and another one that has sagged in the centre of ridge, an eyesore for all time; and if there is a sag anywhere in a roof it is safe to say that it has driven some other part of the building down with it, which could

all have been obviated in the first place by good construction. Another cause of roof sagging can be traced to the foundations of buildings. It has always struck the writer as anomalous that although we have an army of building inspectors and sheaves of building regulations, without exception they all specify the same foundation for a light building with an iron roof as for one with double the timbers in the roof, and perhaps 10 ton of tiles as well, and what this tile roof would weigh when wet the writer would not like to hazard a guess.

BEVELLING OR BACKING HIPS.

If it should be necessary to bevel the top of hips to bring them into the same plane as the rafters, set out a hip plumb cut at outside of wall plate on hip. Then at the top of the hip square off the plumb cut, set off a line equal to half the thickness of hip, and remove the wood from centre of hip to that point. Fig. 18. The bevel for an octagon hip would equal half this allowance.

LENGTH OF RIDGES.

The length of ridge is the difference between the length and breadth of the building, plus the thickness of itself.

RAFTER MEASUREMENTS.

These rafter measurements are all worked out to an imaginary line in the centre of the building. This line must be turned into tim-

ber, so whatever thickness this timber (ridge) will be, the half thickness must be taken off the common rafters only, measured square back from the plumb cut.

CREEPER RAFTERS.

Beneath the hip and valley tables will be found the amount each pair of creepers will shorten coming down the hip. In this pitch each pair of creepers are 1 foot 10½ inches shorter. Take the original length of rafter as given in the tables without any deduction for ridge, and subtract 1 foot 10½ inches from that length, and so on. That is measuring each time to long point on top of rafter. No deduction is made for hip.

CORRECT SHORTENING FOR CREEPERS.

To find the correct shortening for creepers, take the rafter length for the distance required from the tables, if 15-inch spacing is required, then shorten the creepers by the rafter length for 15 inches. By taking the figures required from the two half span columns, that is feet and inches, any spacing at all can be worked out in a moment by adding the feet in the first column and the inches required in the second column.

JACK RAFTERS.

The jack rafters are the same length as the common rafters.

TO MEASURE RAFTERS.

Always measure rafters from top of plumb cut to top of plumb cut at bottom.

SCOTCH VALLEY.

Where the rafters of one roof rest on top of another roof, the long cut at foot is square off the plumb cut, as if it rested on the wall plate. The side cut is the same as the side cut of the roof it rests on.

CUTS FOR GABLE STUDS.

The top cut for gable studs or vertical sheeting is the same cut as the top of common rafter. For horizontal sheeting or collar ties, the cut is square off the plumb cut.

DECIMALS.

6 hundredths means 6/100 of 1 inch, equals $\frac{1}{16}$ of an inch.

12 hundredths equals $\frac{1}{8}$ of an inch.
25 hundredths equals $\frac{1}{4}$ of an inch.
50 hundredths equals $\frac{1}{2}$ of an inch.
75 hundredths equals $\frac{3}{4}$ of an inch.

In the total length of a rafter anything less than 6/100 can be discarded. When working in wood, of course. In steel construction accuracy is essential. If bolt holes were $\frac{1}{16}$ inch out of true they would cause a lot of annoyance.

DEFINITIONS.

RISE means the distance a rafter rises in 12 inches or 12 feet, 12 being unity, whether feet or inches.

RUN is the level distance a rafter covers.

SQUARE OFF means at 90 degrees.

COMMON RAFTER abuts on a ridge with its foot on a wall plate.

CREEPER RAFTER abuts on a hip with its foot on a wall plate.

JACK RAFTER is set at the end of a ridge.

CRIPPLE RAFTER is a rafter without a foot abutting at a valley.

Rise is measured from top of rafter at wall plate and ridge, or from wall plate to the corresponding point on rafter at ridge. See Fig. 25.

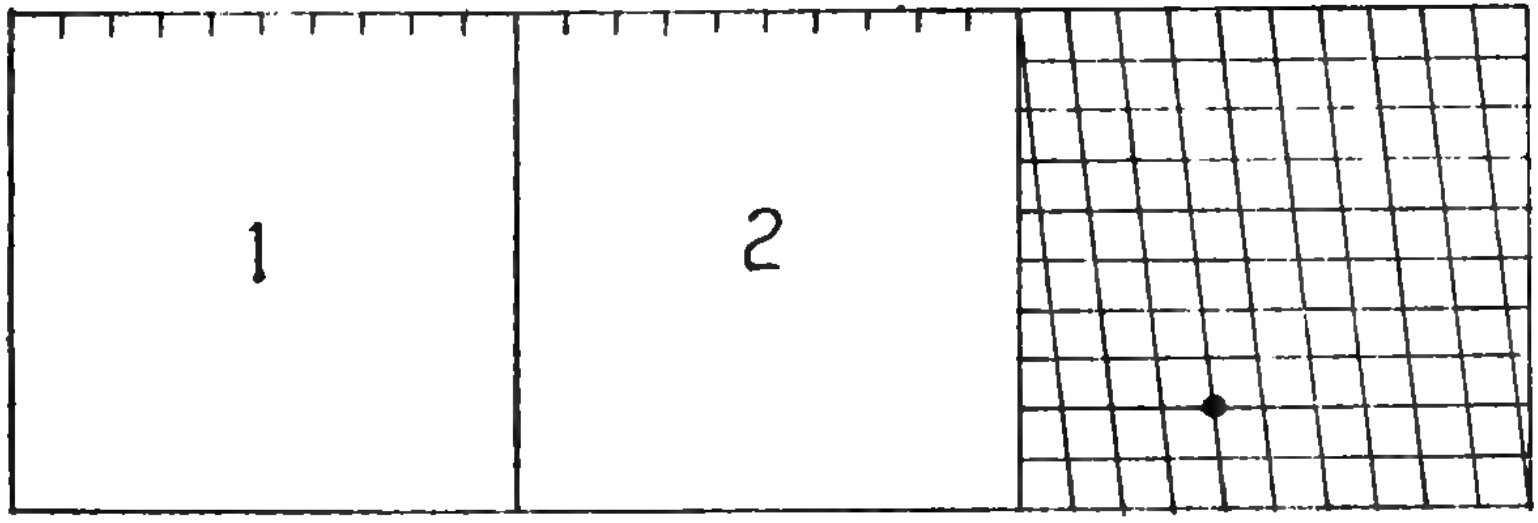
THE DIAGONAL SCALE.

The writer has been asked at times why these tables were not worked out in fractions of inches instead of hundredths, as carpenters cannot measure in hundredths. I contend that the tables would lose their accuracy if worked out in fractions of inches as shown on a carpenter's rule. On some steel squares the diagonal scale is marked showing the square inch divided into its hundred parts by parallel and diagonal lines. The same scale set out on school children's rules shows plainly how to measure hundredths of inches. Fig. 19 shows the method by

FIG.19

DIAGONAL SCALE

2″ · 32 (HUNDREDTHS)



taking one square inch and dividing it into 10 equal parts horizontally and 10 equal parts vertically. Draw parallel lines from these horizontal points and diagonal lines from top to bottom, starting at nothing at the top corner and drawing the first diagonal line to the first point, and continuing these diagonals to tenth point. Every intersection will be 1/100th of an inch. The fifth intersection on the sixth diagonal would be 55/100ths of an inch and so on. By using a pair of dividers any of these fractions can be taken off. Although the carpenter is not called on to work in thousandths, instead of one square inch make it 10 inches x 1 inch, divide the long side into 10ths of inches, draw the lines the same way, and this will show 1,000ths. Fig. 19.

LENGTHS OF TIMBERS.

As most Australian timber is cut into logs by hand before reaching the mills. and is mostly grown in mountainous country where at times it is difficult to keep the cuts square, it is the practice for the fallers to allow 4 inches extra length on each log to allow for squaring on the buildings. whereas imported timbers such as oregon are cut fairly neat. As some of these rafter measurements are given to the exact foot, such as 10 feet, it should be borne in mind that if using imported timber, and if the rafter was cut flat footed on the plate (that is, if the point of rafter was flush with the outside of wall

plate) a 10-foot length would cut this rafter, but if the rafter was cut with a birdsmouth to overhang the wall, it would stand up about two-thirds of its depth above the plate, and would need a plumb cut at bottom as the angle of this cut is 4 x 3. It would need a 10 feet 3 inches length to cut this rafter.

MORE ABOUT CREEPERS.

It will be noted that no allowance is made for shortening creepers to allow for half the thickness of hips. By measuring to the long point on top, and as the long point is half the thickness of the rafter above the centre, there is no necessity to deduct half the thickness of hip from the creeper. This measurement is worked out on the standard thickness of hips used in this country. If the hip were of 3-inch or 4-inch stuff, it would be necessary to deduct the half thickness of the hip from the length of the first pair of creepers.

SALIENT POINTS.

One of the main objects of writing this book was that it should be essentially a book of reference to roofing always available in the carpenter's pocket or lunch bag. How often do you hear the remark: "Leave it till tomorrow and I will look it up at home tonight." This book being pocket size should be available all the time for reference on the job, and I honestly believe that if the reader will go through it, mastering the points one

by one, he will find that roofing difficulties will disappear. I think also that we have discussed the question very fully, and if we go over the salient points once more without being tiresome, you will agree with me that I have nearly covered all points.

1. Set out rafter seats and joists while plates are at ground level.
2. Reason out rise and run. This is the key to the whole business.
3. Cut ridge right length as directed. If this is done all materials cut on one side of hips will fit perfectly on the other side, meaning roofing material.
4. Take rafter lengths and cuts from the Rafter Tables.
5. Make rafter gadget as at Fig. 8 for marking out rafters.
6. Study the side cut of the purlin. You will find many uses for it.
7. Be sure that hip valley and common rafters are all in the one plane, that is, leave the same amount of wood in each at the wall plate.
8. String a line at top and bottom of rafters when cutting overhang, and scribe with rule.
9. When propping purlins do not put props on door studs.
10. The tilting batten for tiles and back of spout should be cut with the same cut as the top of rafter.

11. Remember that every cut given in this book will work on any square or rectangular hopper of the same pitch.
12. Look after this book. Keep it clean and it will perform at any time.

THE HYPOTENEUSE OF THESE TRIANGLES.

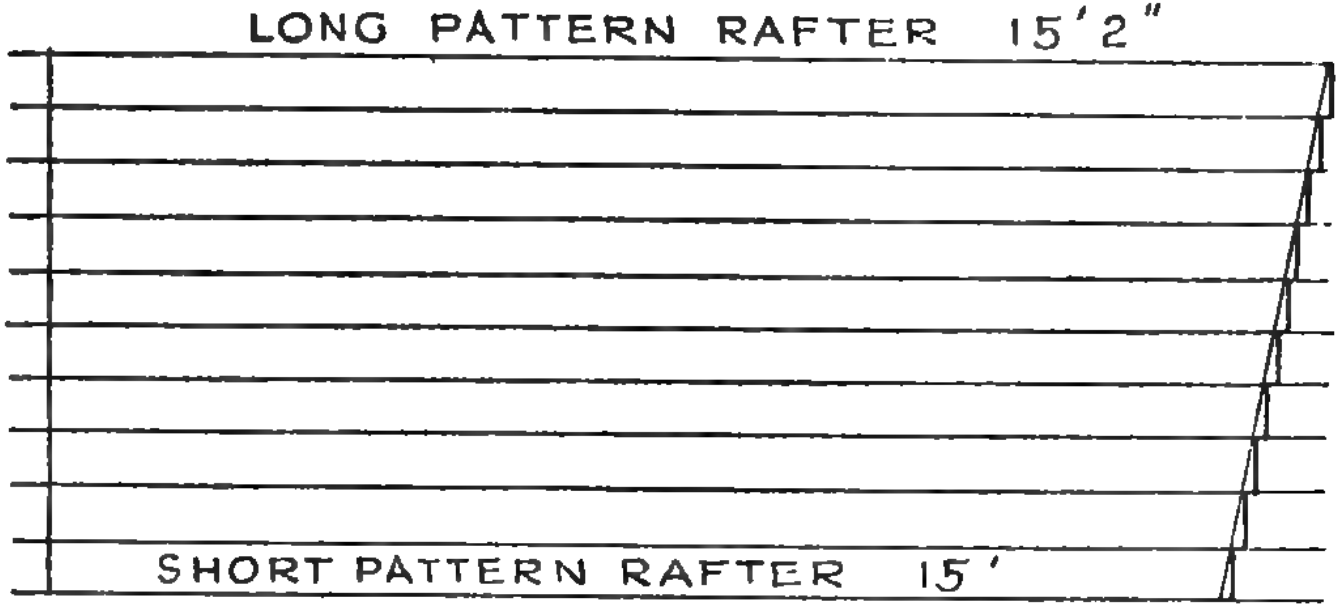
It might be profitable to the reader if we devote a little space to discussing the methods by which these rafter tables are worked out. As the half sections of all roofs are no more or less than a series of right-angled triangles, the height and base of which are known, it is only necessary to work out the hypoteneuse, or the diagonal joining the height and base, which in roofing language would be rise and run. Taking the figures 6-8-10, which are so well known, how do we know that 10 feet is the true diagonal measurement of 6 feet and 8 feet? To determine the length of this diagonal, which represents the rafter, multiply the height or rise by itself (6 x 6 equals 36), multiply the base or run by itself (8 x 8 equals 64). The sum of these two results (36 plus 64) equals 100. As 10 is the square of 100 it follows that 10 is the true length of the diagonal or hypoteneuse.

The rule for any right-angled triangle is that the square of the hypoteneuse equals the sum of the squares of the other two sides.

As there are only three lengths in these tables that finish without fractions, we will take another triangle that is not used so

FIG. 20

CUTTING RAFTERS FOR BUILDING OUT OF PARALLEL



much, but can be used for squaring structures instead of the 6–8–10, i.e., 5–12–13. 5 x 5 equals 25. 12 x 12 equals 144. 25 plus 144 equals 169, and the square root of 169 is 13, therefore the lengths of the three sides of this triangle are:—Rise 5, run 12, and rafter length or diagonal 13, whether in feet or inches. One more example and we can leave this. Take 6 feet and 12 feet representing rise and run of a ¼ pitch roof. 6 x 6 equals 36. 12 x 12 equals 144. 36 plus 144 equals 180, and the square root of 180 is 13.42/100ths of an inch. or 13$\frac{5}{12}$ which is as close as will register on a carpenter's rule. In regard to this chapter the wood butcher has said hundreds of times, and will say it again, that this is alright in theory but not in practice, but the writer emphatically says that it will work in any circumstances, even if a building is out of parallel. Fig. 20 will show how every rafter can be cut at the one operation by using these tables.

BUILDING OUT OF PARALLEL.

To cut rafters for a building that is, say, 4 inches wider at one end than the other, measure both ends of building, and if one end is 30 feet and the other 30 feet 4 inches, find the rafter length for 15 feet for one end and the rafter length for 15 feet 2 inches for the other end; mark these as two patterns. Place all the rafters needed for one side of building on the stools. Place the patterns one on each side, draw a diagonal line from long pattern

to short pattern, then separate the rafters and square each one at the diagonal line. This also applies for levelling a wall where base is out of level.

VARIOUS TYPES OF EAVES.

Figs. 21, 22, 23 show the various types of eaves. Fig. 24 shows the method of cutting one sheet of one-sided material such as fibro-cement to fit small gable.

RISE AND RUN.

Fig. 25 shows from where rise and run are measured.

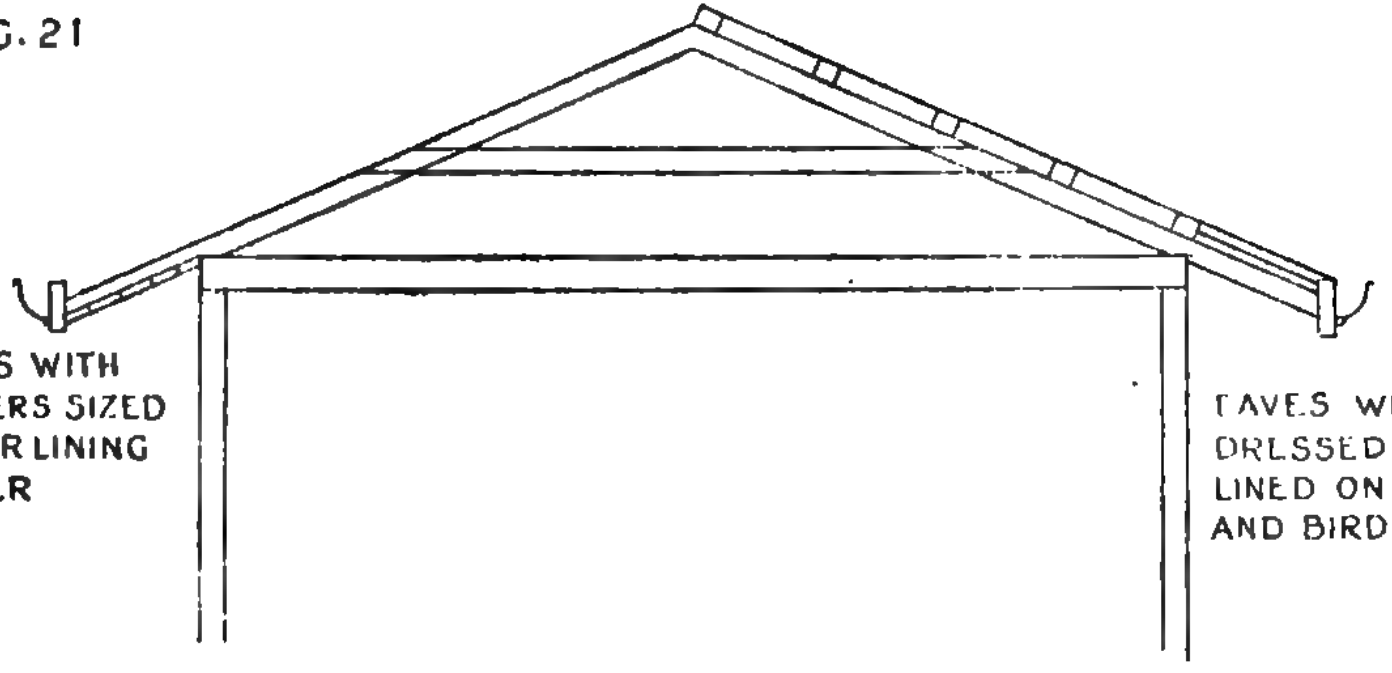
TILTING BATTEN.

In good roof construction an angle batten commonly called a tilting batten is placed at the bottom of rafters to make good fixing for the back of the spouting, and also to tilt the bottom of the first row of tiles up into the same plane as the rest of the tiles. This batten should be cut on the same angle as the plumb cut of the common rafter.

CRIPPLED CREEPERS BETWEEN HIP AND VALLEY.

Where a building has a projection and the hip and valley run parallel to each other. To find the length of the rafters to run between hip and valley, if the projection stood out, say,

FIG. 21



EAVES WITH RAFTERS SIZED UP FOR LINING UNDER

EAVES WITH DRESSED ENDS LINED ON TOP AND BIRDBOARD

FIG. 22

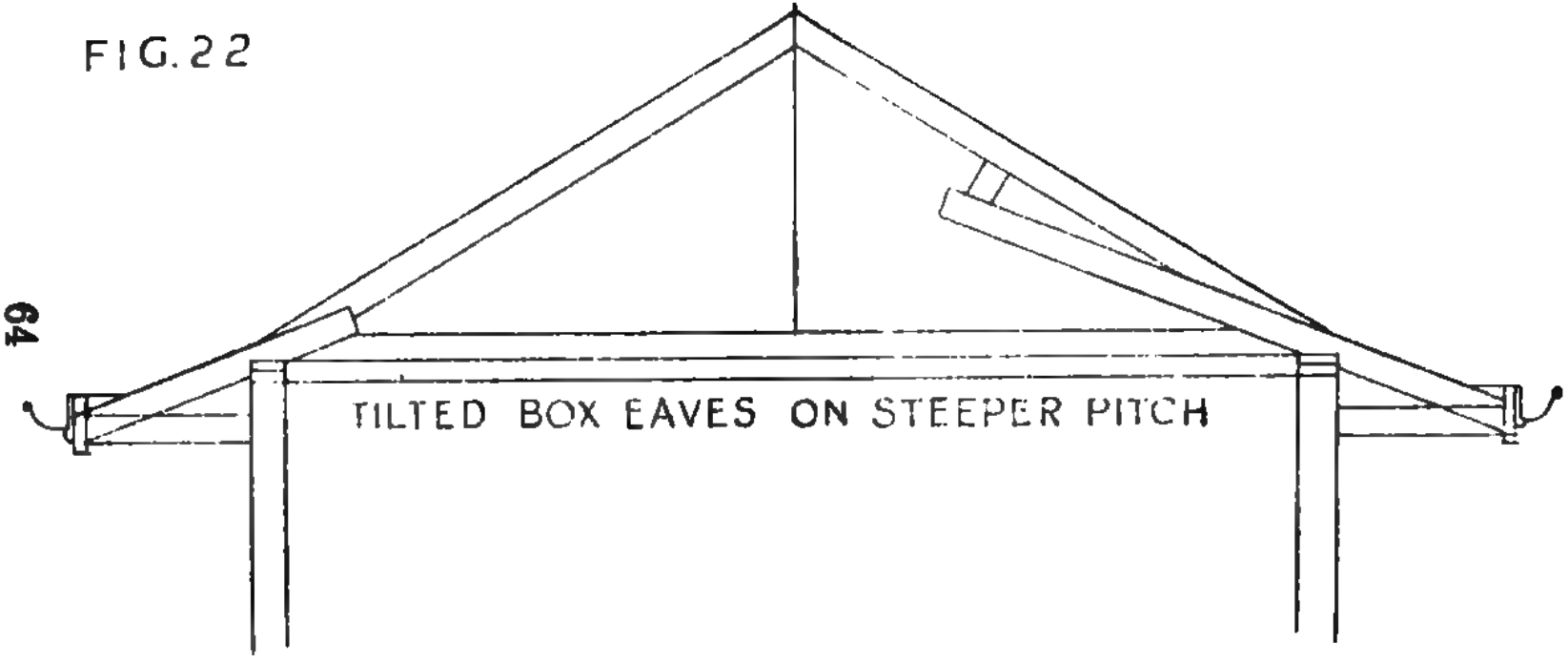


FIG. 23

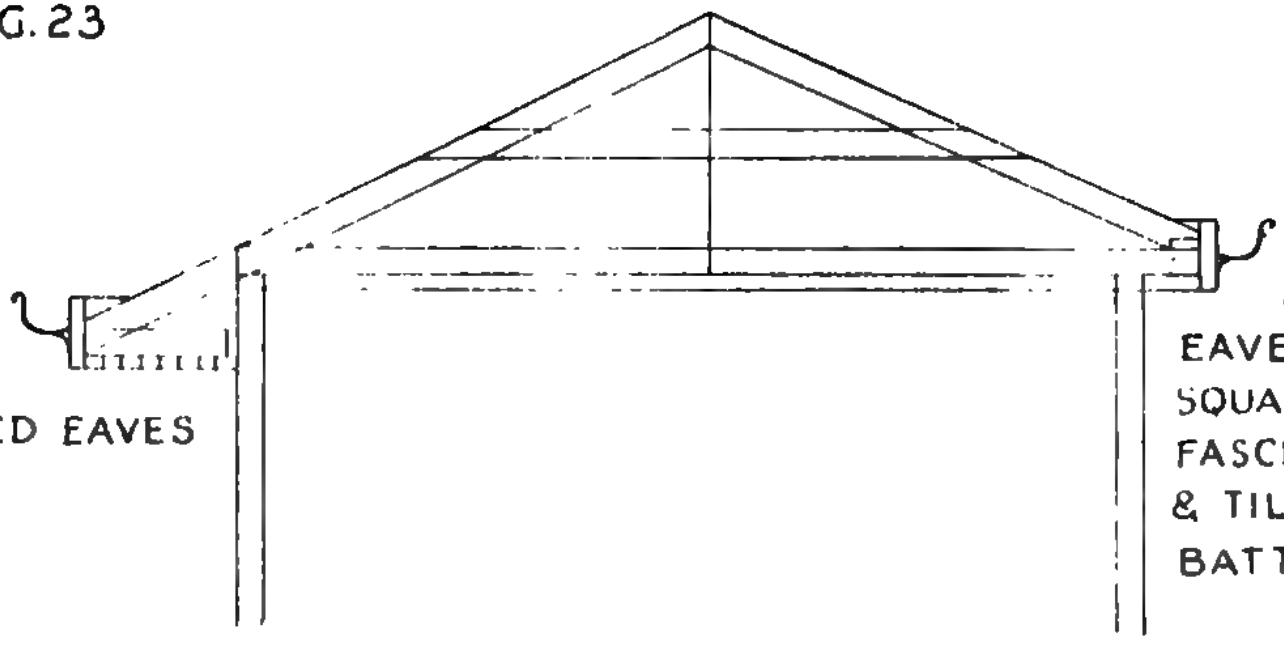
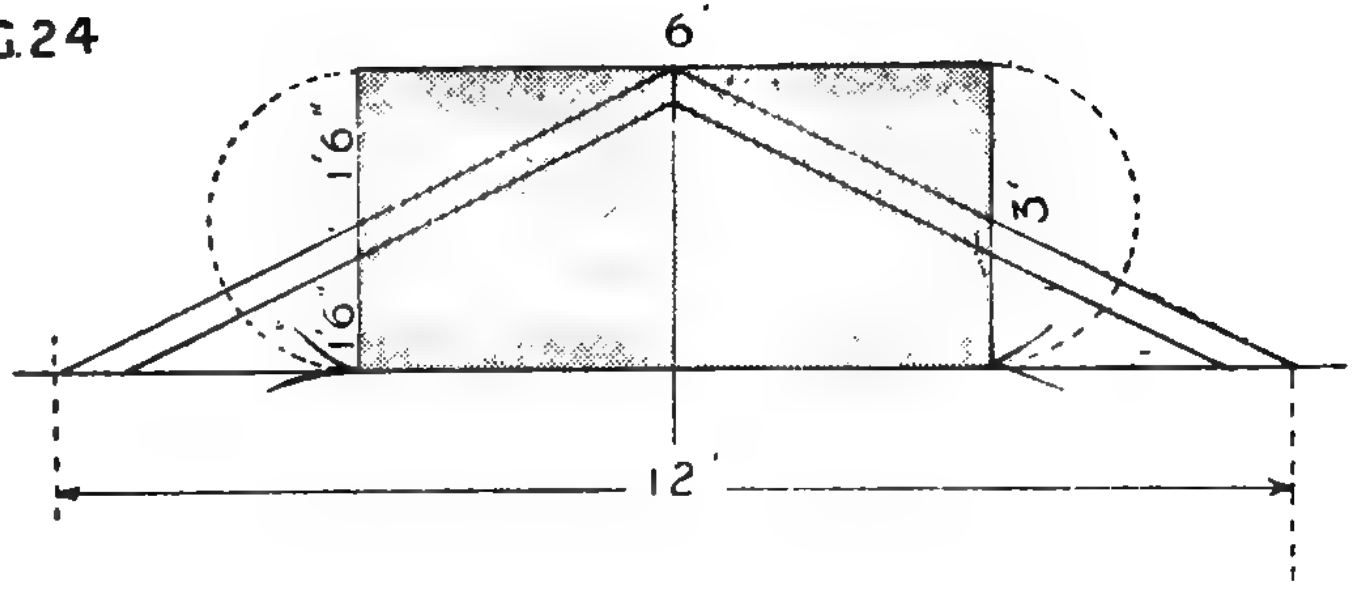
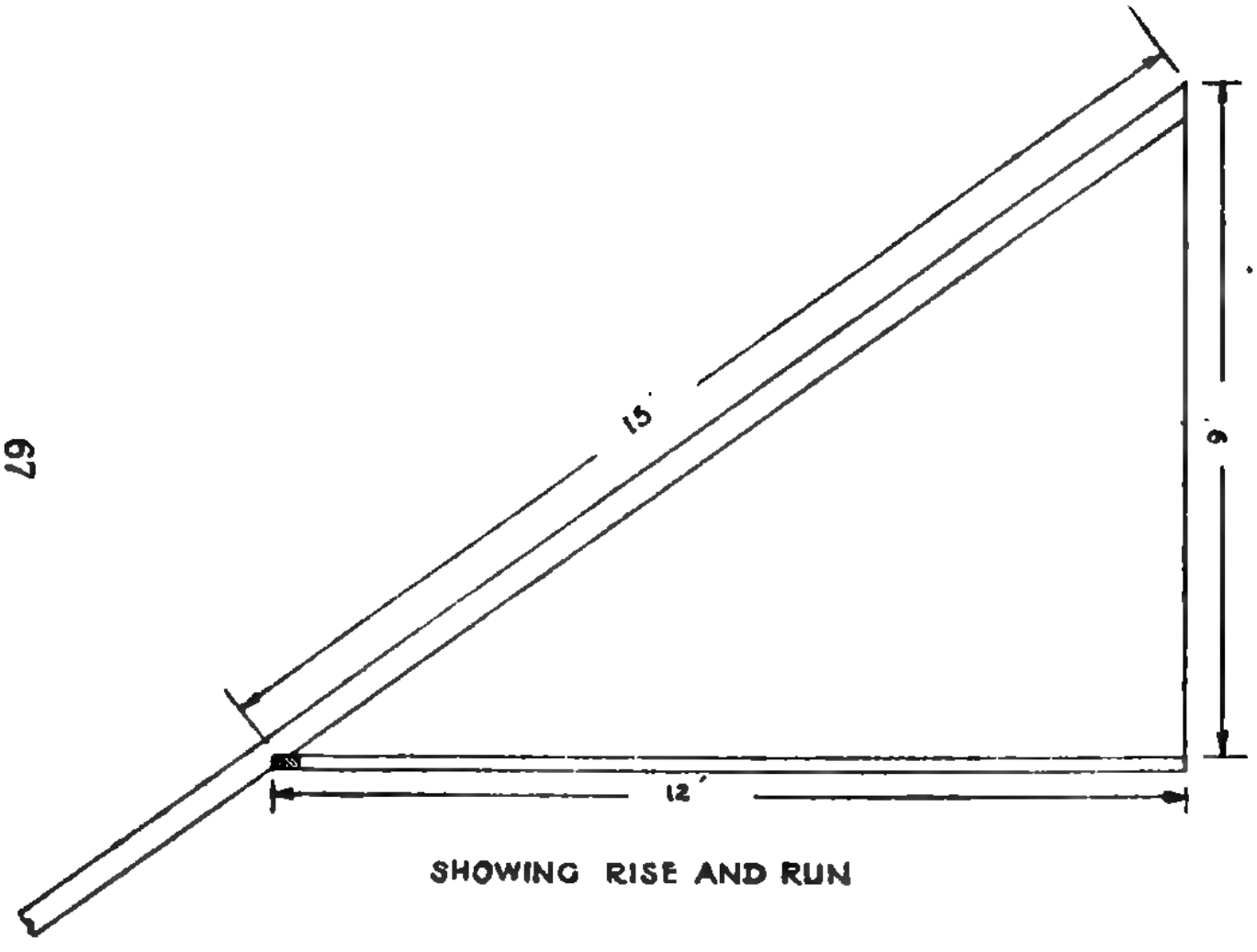

BOXED EAVES
EAVE · WITH
SQUARE SOFFIT
FASCIA BOARD
& TILTING
BATTEN

FIG.24



CUTTING 6X3 SHEET OF ONESIDED MATERIAL TO FIT SMALL GABLE



SHOWING RISE AND RUN

FIG. 25.

4 feet from hip corner to valley corner. The length of these cripples would be the rafter length for 4 feet or in all cases the rafter length for the length of wall plate, with the same side cuts and both plumb cuts the same way.

LOW RIDGES AND BROKEN HIP.

Where there is a broken hip meeting a lower ridge, this ridge is cut with a mitre and square cut, and the bottom of the broken hip left long and nailed on the end of ridge and any surplus length coming in the way of the batten cut off when fixed.

LONG HIPS.

Where there are three long hips and a broken hip, by ordering four hips the full length, the fourth hip will cut the broken or flying hip, and the offcut will be right for one of the projection hips.

BIRD BOARD.

The birdsmouth at the bottom of rafters to fit plate should be squared so that the rafters will sit up plumb. Any carelessness with these will make it difficult to fit bird boards.

LINING UNDER RAFTERS AT EAVES.

Where the underside of rafters at overhang is to be lined, the part of rafters that overhang should all be gauged and squared up to one size, ensuring a good line and obviating packing. See Fig. 21.

RAFTER FIGURES.

Should the reader have any difficulty in finding the rafter lengths on account of the odd inches in the half span of building, it will simplify matters to determine the rafter lengths as follows:—Assuming that your building has a half span of 12 feet 3 inches. Take the rafter length for the even number of feet, which is 15 feet. Mark a plumb cut on the rafter at 15 feet from that mark, and square out with your rule the 3 inches needed, and mark plumb cut at the 3-inch mark, see Fig. 26. The shortening for the ridge is measured off in the same way.

MORE ABOUT HIPS.

Before nailing creepers to the hips, string three lines from top of hip to wall plate, one on each side of hip instead of gauge lines, for rafter lines, and one line on top to straighten the hip to. See that all lines stand away from and not touch the hip.

OCTAGONS.

The writer contends that this book would not be complete without devoting a little space to Octagon Roofing, although this type of building has gone out of fashion somewhat. Still, history has a habit of repeating itself, and if some of the younger brigade were asked to set out and roof an eight-sided building I am afraid it would puzzle them.

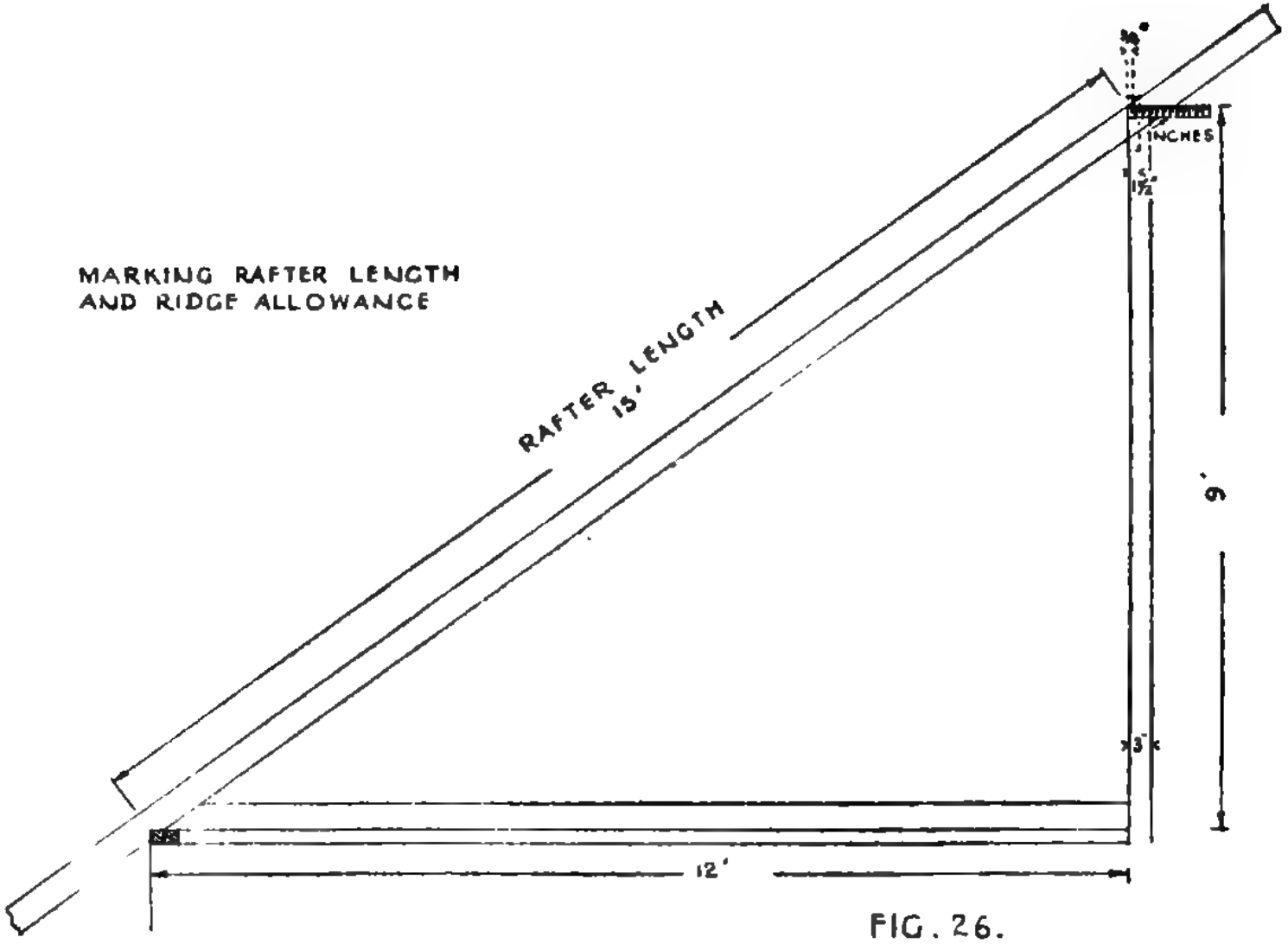

MARKING RAFTER LENGTH
AND RIDGE ALLOWANCE
RAFTER LENGTH
15'
INCHES
1½"
9'
3"
12'

FIG. 26.

SETTING OUT.

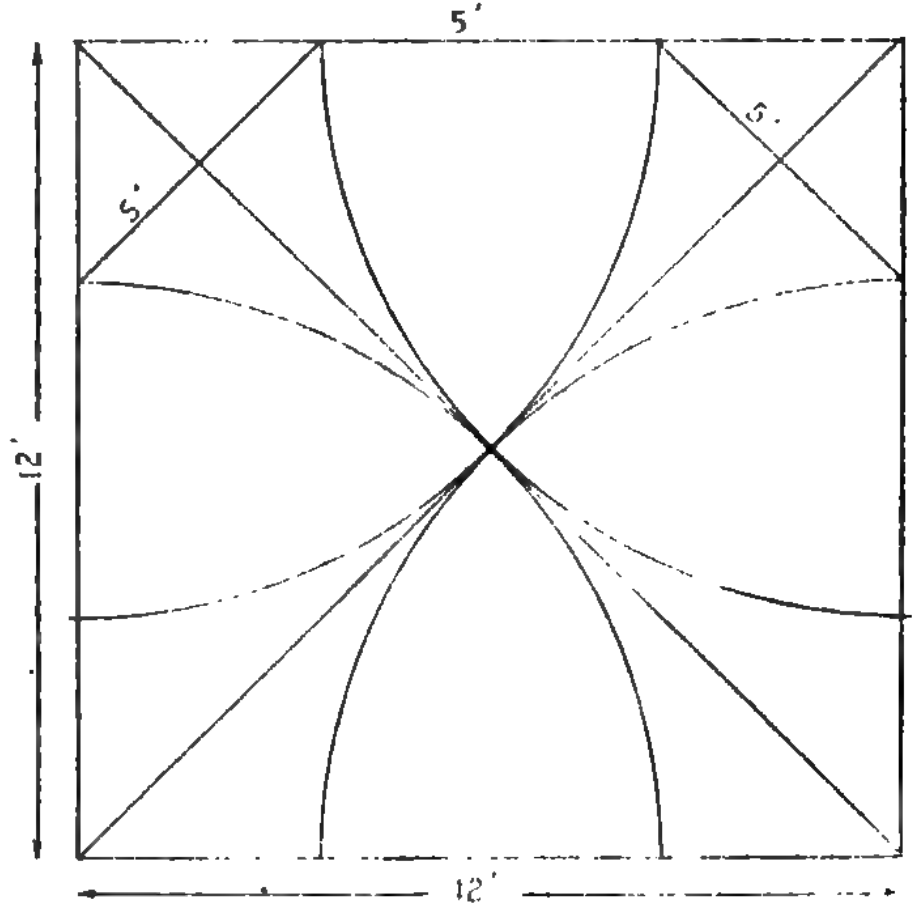
To set out an octagon from a square. Find the centre of square with two diagonal lines, then with the corner of the square as centre, using the centre of the square as radius, with a compass or trammel moving right and left through the centre till it cuts two sides, mark these points and move trammel to the other corners of the square in turn till the four sides are marked. Join these marks across the corners and you will have a complete octagon. Fig. 27.

OCTAGON ROOF.

In this type of roof four pairs of hips are needed. The lengths of these are given in the hip tables relating to octagons. The run of an octagon is half its square width. Assuming that your particular roof has a run of 6 feet and a rise of 6 feet in 12 feet, or ½ pitch. Look for the table referring to this pitch and opposite 6 feet in the half span column find the figures 7 feet 1 92/100ths inches, which is the exact length of the first of hips. The second pair are cut shorter by the half thickness of the first pair, measured square back from the plumb cut. The third and fourth pair are cut shorter by half the mitre thickness of the first pair, and these rafters have side cuts extending back on both sides of each rafter. These bevels are given on the diagram, Fig. 28. The middle jack rafter is the same length and plumb cut as a common rafter for any roof of the same

FIG. 21

OCTAGON
THE SIDE EQUALS 5/12 OF ITS DIAMETER



OCTAGON
CUTS

RISE 6
RUN 12
¼ PITCH

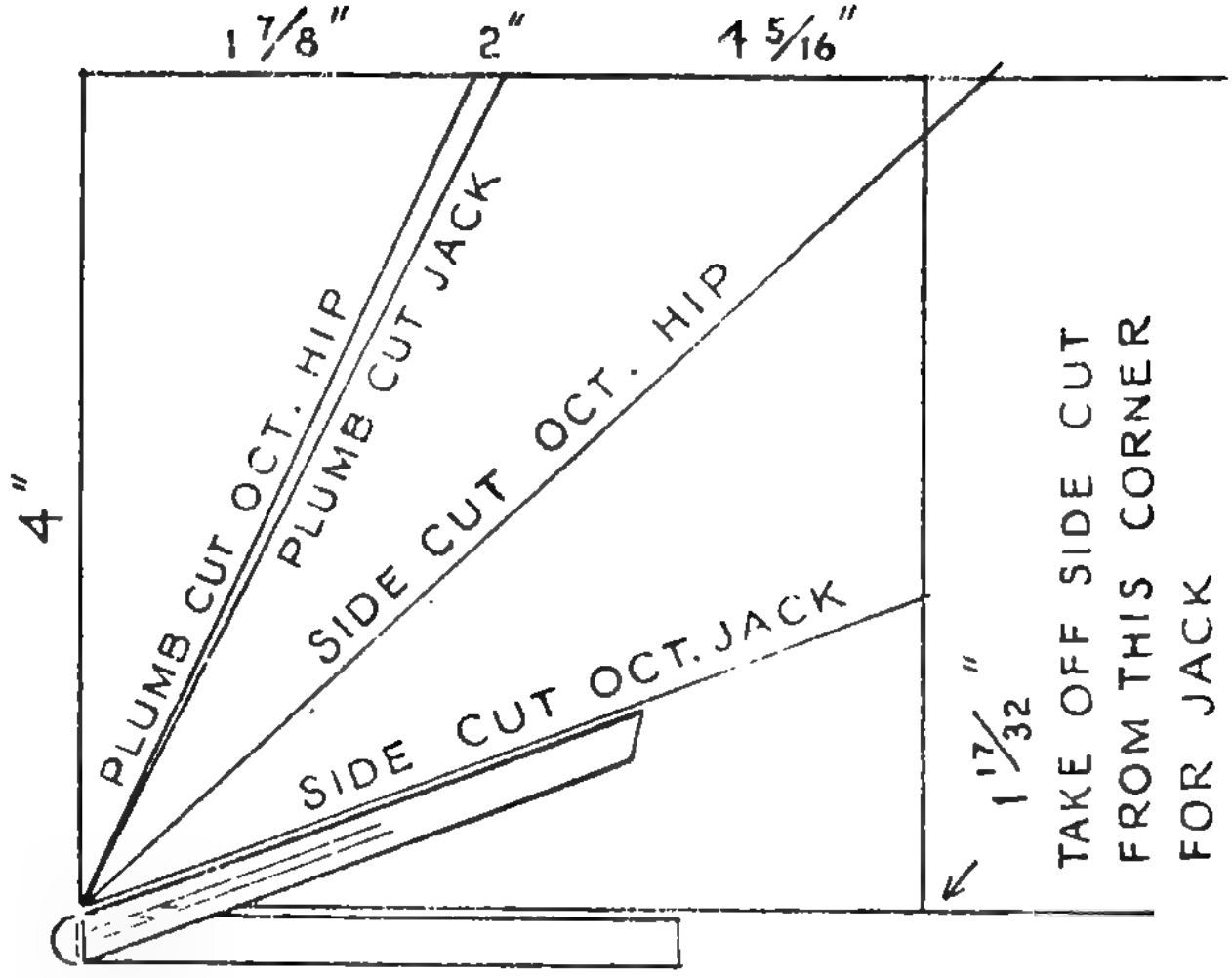


FIG. 28

CUTS FOR OCTAGON RAFTERS

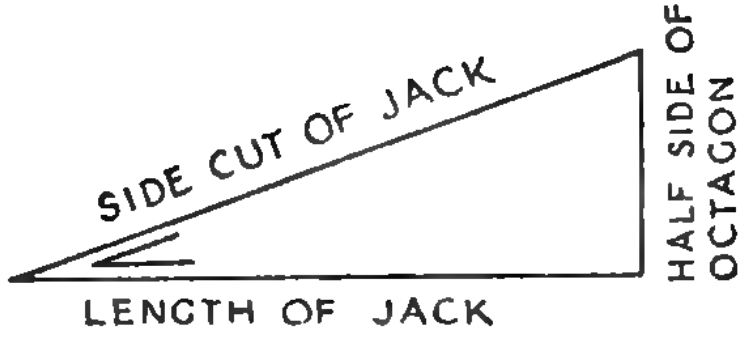
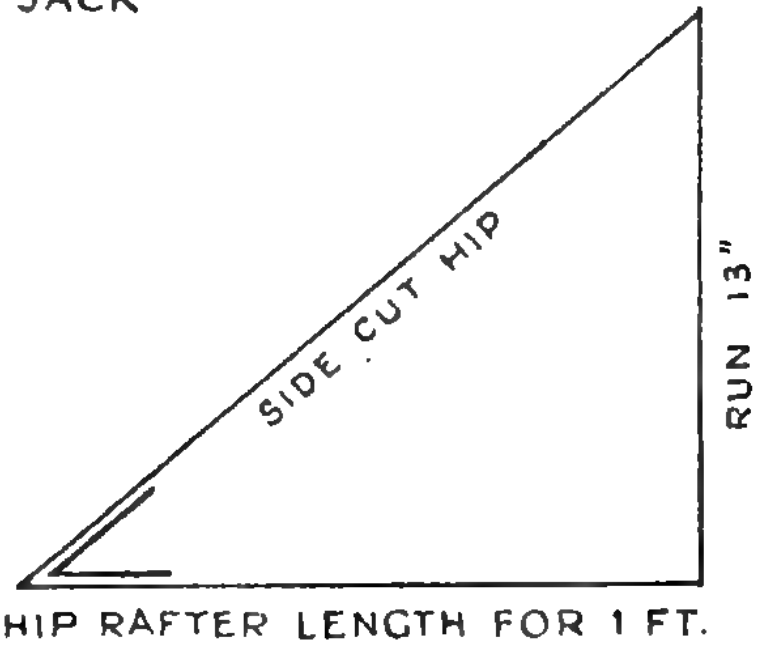


FIG 28 a.



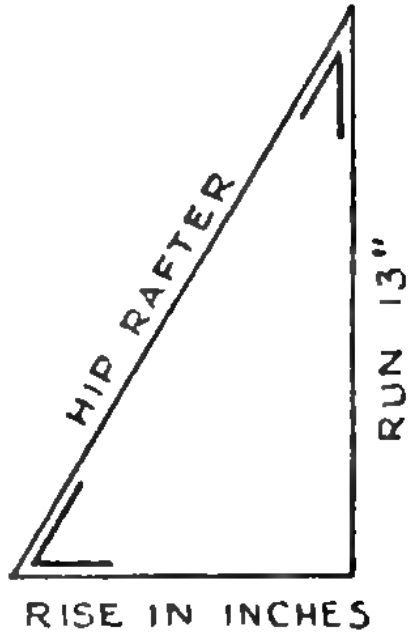
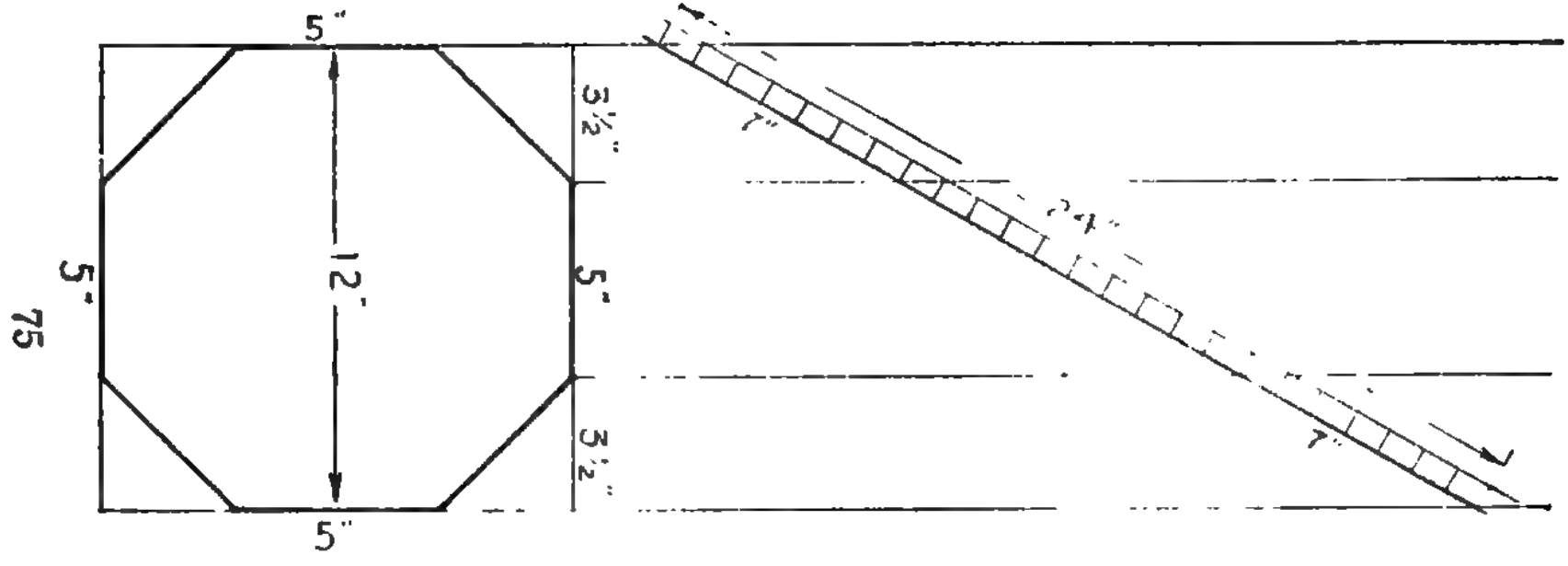


FIG 29



OCTAGON REDUCED FROM 12" SQUARE

pitch, and must be shortened by twice the amount of the second and third pairs of hips. For the length of the short rafters between jack and hip divide the length of jack by the number of spaces required. The side bevels for hips is found by taking the length of the first pair of hips on one side of a right angle, and the run on the other side. A diagonal between these points will give the side cut, which is on the long corner. The plumb cut is found in another right angle having the run 13 feet on one side and the rise 6 feet on the other side. Draw diagonal between the two points, which will represent the hip when in position. The cut is obvious. For the side cut of the jack and creepers, take the length of jack on the base of the right angle, and half the side of the octagon on the other side. The cut will be found in the long corner. The angles of all these cuts will be found underneath the octagon rafter table being used. As the side cut of the jacks is very long, care must be taken to see that it is taken off the side of the diagram instead of the top. Figs. 28, 28a, 30.

INTERSECTION OF RAFTERS AT APEX.

If an octagon block or finial is used at the apex of an octagon roof it will obviate all the shortening of the hips, as they will be cut all the one length, and will butt against the finial or flag pole, and will give sound fixing for hips. These will all butt on a flat surface and will not require a side cut.

SHAPING AN OCTAGON BLOCK.

Whatever size your square timber may be, lay the rule diagonally across the timber as at Fig. 29 and mark as shown. If your rafters are of 1½-inch stuff, it will take a 3¾-inch square timber to make an octagon finial with 1½-inch faces to match rafters. To set this out lay your rule diagonally across the timber till it shows 6 inches on timber, mark off at 1¾ inches and 4¼ inches, or 1¾ inches from each end. Mark all four sides and remove corners of timber to these lines, and you will have an eight-sided stick. These figures can be doubled again and again as the timber increases in size, as 3½-inch and 3½-inch, or 7-inch and 7-inch, using 12 inches and 24 inches of the rule respectively.

OCTAGON CUTS.

The diagrams for the octagon cuts represent the lengths for one foot of the roof, and should be taken in inches. Fig. 28a.

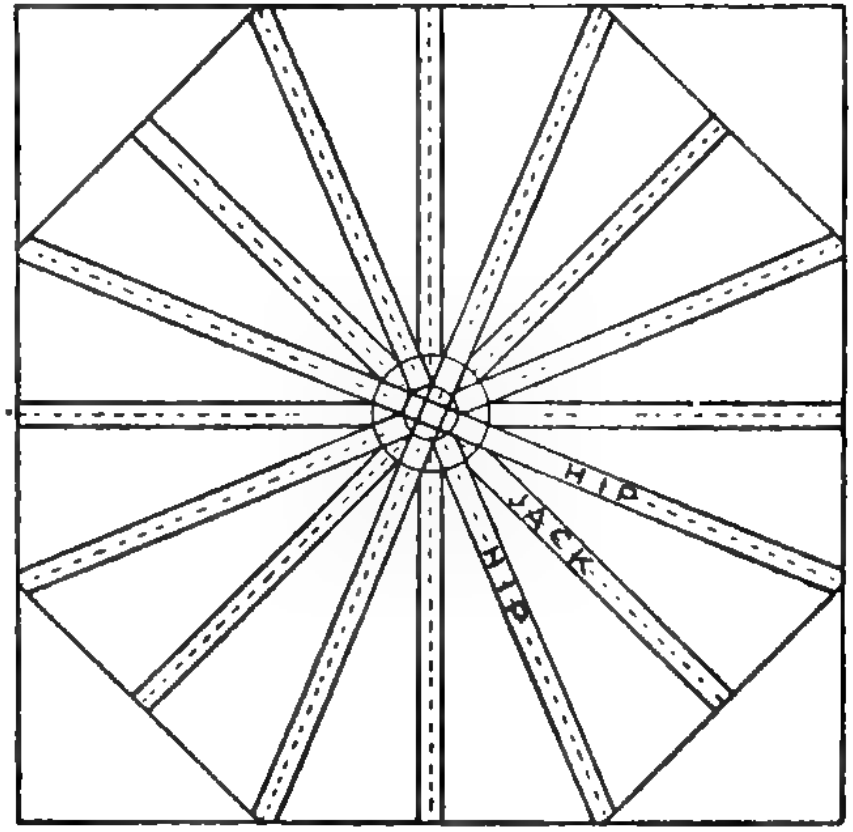
PLUMB CUT OCTAGON JACK.

The plumb cut for octagon jack is the same cut as for a common rafter.

ROOF PLANS FOR HIP ROOF.

The last five pages in this book are roof plans. If the reader will complete these one by one, taking a different pitch for each one, he will find that by the time he has completed

FIG. 30



INTERSECTIONS & SHORTENINGS FOR OCTAGON ROOF

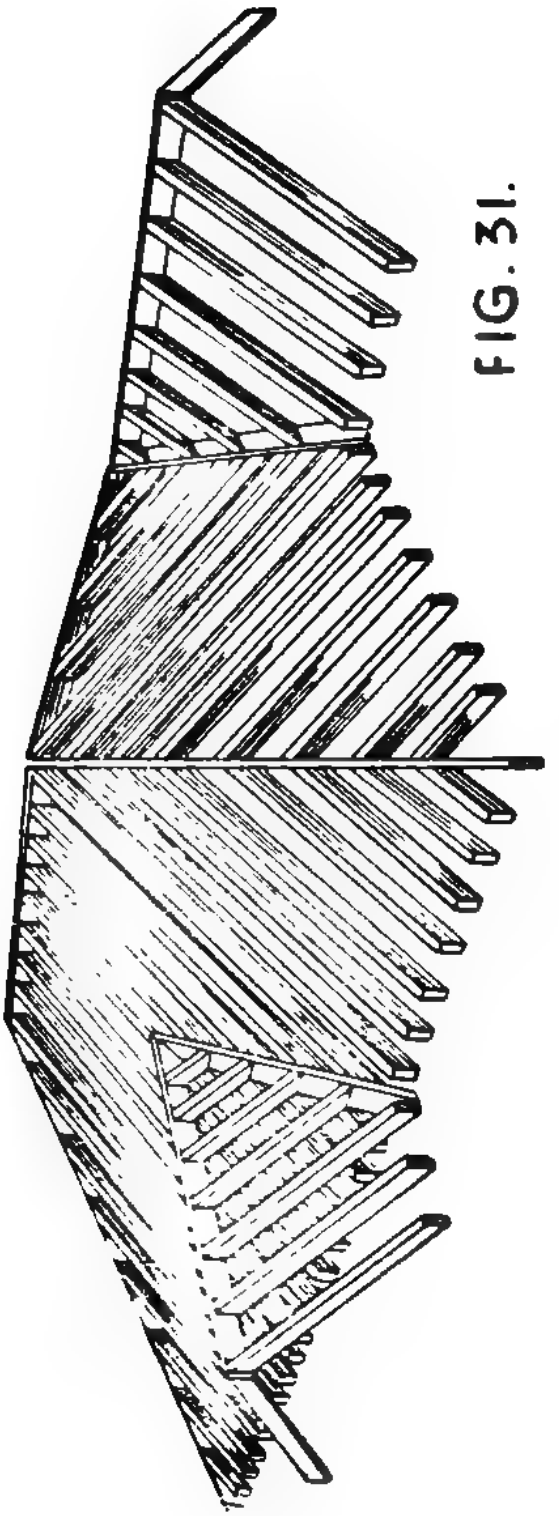


FIG. 31.

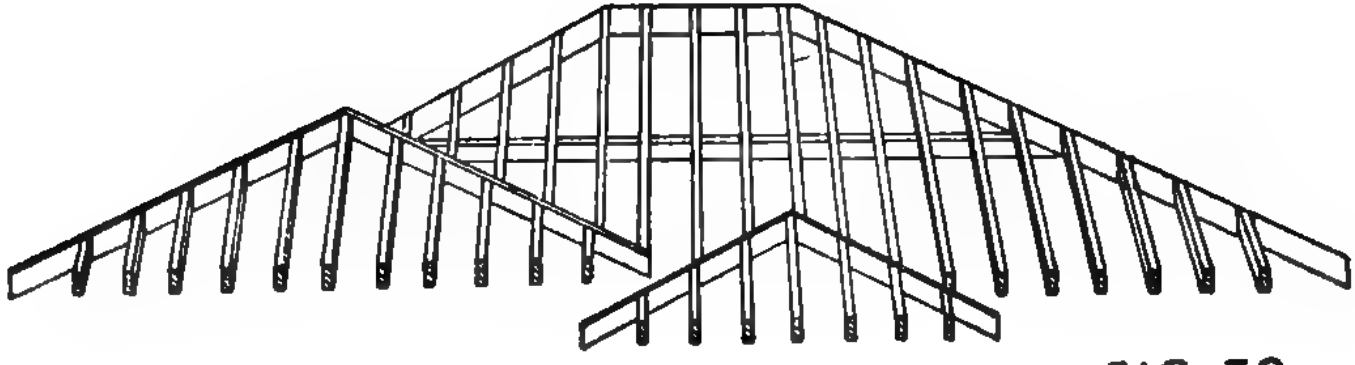


FIG. 32.

the last one he will have learned more about roofing than most men learn in a lifetime. To fill these plans in, find the length of ridge first, lengths of common rafters and creepers second, lengths of hips third and length of purlins last. Time limit to complete, two minutes.

ROOF MODEL.

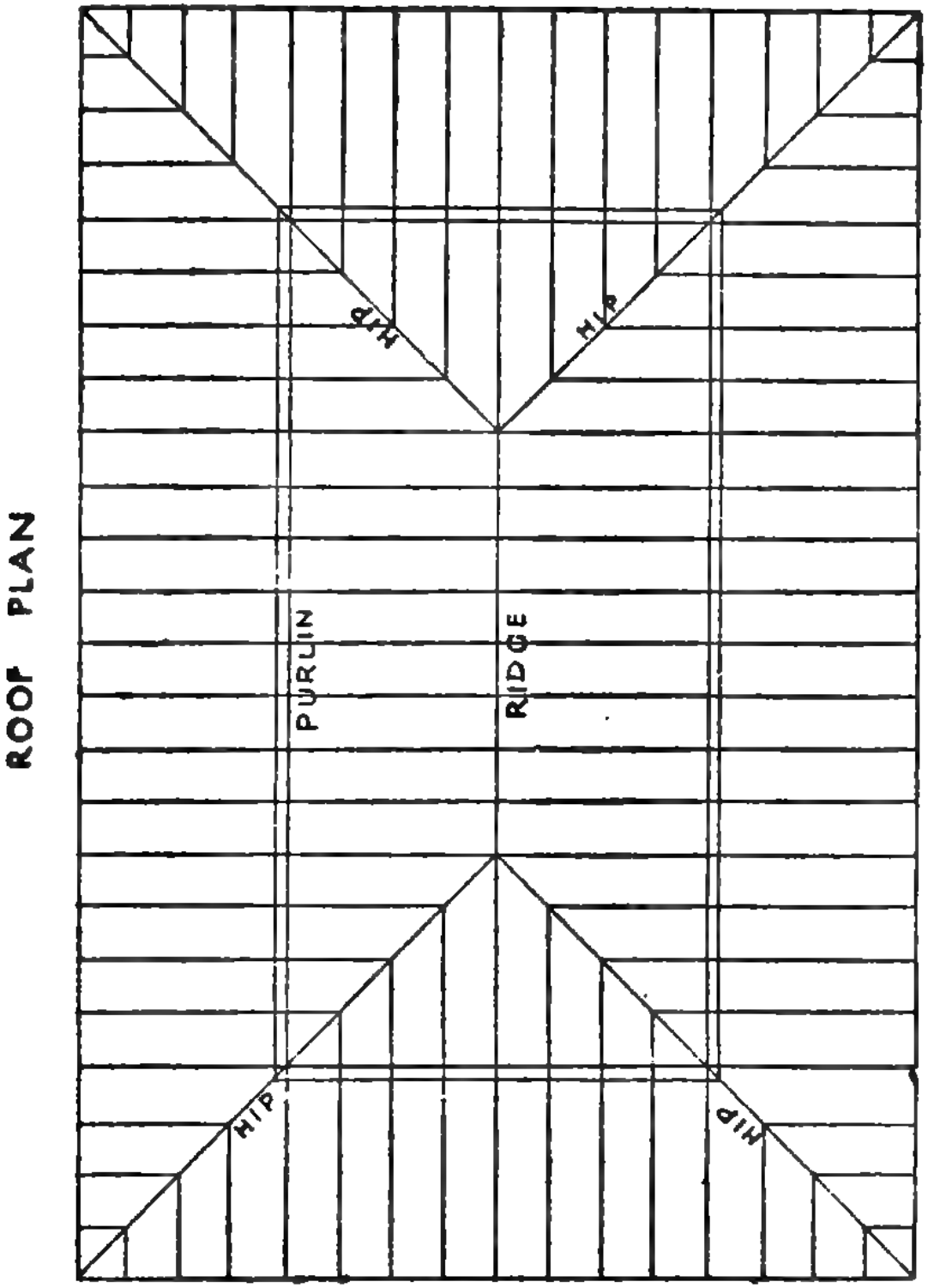
Fig. 31 shows a roof model built by a boy in his first year as a carpenter. The figures in these tables were used to set this out. Note the two different valleys.

Figs. 31 and 32 show two typical Australian roofs.

FINIS.

Looking back over these pages, the writer concludes that if they are made any bulkier, they will defeat the purpose for which this book has been written. There are a few problems in roofing not touched upon, but the writer is confident that when the reader has grasped the principles laid down in these pages he will be quite competent to deal with any unsual problem as it comes along.

A. W. HANCOCK.



ROOF PLAN

1/24th Pitch. 1 ft. RISE to 12 ft. RUN. 4 deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	4
2	2	0	8
3	3	0	12
4	4	0	16
5	5	0	20
6	6	0	24
7	7	0	28
8	8	0	32
9	9	0	36
10	10	0	40
11	11	0	44
12	12	0	48
13	13	0	52
14	14	0	56
15	15	0	60
16	16	0	64
17	17	0	68
18	18	0	72
19	19	0	76
20	20	0	80

Half Span Ins	Ft.	Ins.	Hts.
1/4			26
1/2			52
3/4			78
1		1	0
2		2	0
3		3	1
4		4	1
5		5	1
6		6	2
7		7	2
8		8	2
9		9	3
10		10	3
11		11	4
12	1	0	4

Plumb Cut Rftr.	4 x 3/8
Side Cut Rftr.	4 x 4 1/16
Plumb Cut Hip	4 x 1/4
Side Cut Hip	4 x 4 1/16
Down Cut Purl.	4 x 1/2
Side Cut Purl.	4 x 3 31/32

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	2
2	2	10	4
3	4	3	6
4	5	8	8
5	7	1	10
6	8	6	12
7	9	11	14
8	11	4	16
9	12	9	18
10	14	2	20
11	15	7	22
12	17	0	24
13	18	5	26
14	19	10	28
15	21	3	30
16	22	8	32
17	24	1	34
18	25	6	36
19	26	11	38
20	28	4	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			35
1/2			70
3/4		1	5
1		1	41
2		2	82
3		4	24
4		5	66
5		7	8
6		8	50
7		9	92
8		11	34
9	1	0	76
10	1	2	18
11	1	3	60
12	1	5	2

Creeper Rafters 1 ft. 6 1/16 in. shorter each pair for 1 ft. 6 in. spacing.

1 ft. 3 in. RISE to 12 ft. RUN. 5¼ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	7
2	2	0	14
3	3	0	21
4	4	0	28
5	5	0	35
6	6	0	42
7	7	0	47
8	8	0	54
9	9	0	62
10	10	0	70
11	11	0	77
12	12	0	84
13	13	0	91
14	14	0	98
15	15	1	5
16	16	1	12
17	17	1	19
18	18	1	26
19	19	1	33
20	20	1	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			26
½			52
¾			79
1		1	1
2		2	2
3		3	2
4		4	3
5		5	4
6		6	4
7		7	5
8		8	5
9		9	6
10		10	6
11		11	7
12	1	0	7

Plumb Cut Rftr	4 x 7/16
Side Cut Rftr.	4 x 4 1/16
Plumb Cut Hip	4 x 5/16
Side Cut Hip	4 x 4 1/16
Down Cut Purl.	4 x ½
Side Cut Purl.	4 x 3 31/32

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	4
2	2	10	8
3	4	3	12
4	5	8	16
5	7	1	20
6	8	6	24
7	9	11	28
8	11	4	32
9	12	9	36
10	14	2	40
11	15	7	44
12	17	0	48
13	18	5	52
14	19	10	56
15	21	3	60
16	22	8	64
17	24	1	68
18	25	6	72
19	26	11	76
20	28	4	80

Half Span Ins.	Ft.	Ins.	Hts.
¼			35
½			70
¾		1	6
1		1	42
2		2	84
3		4	26
4		5	68
5		7	10
6		8	52
7		9	94
8		11	36
9	1	0	78
10	1	2	20
11	1	3	62
12	1	5	4

Creeper Rafters

1ft. 6⅛in. shorter each pair for 1ft. 6in. spacing.

1 ft. 6 in. RISE to 12 ft. RUN. 6½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	10
2	2	0	20
3	3	0	30
4	4	0	40
5	5	0	50
6	6	0	60
7	7	0	70
8	8	0	80
9	9	0	90
10	10	1	0
11	11	1	10
12	12	1	20
13	13	1	30
14	14	1	40
15	15	1	50
16	16	1	60
17	17	1	70
18	18	1	80
19	19	1	90
20	20	2	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			27
½			55
¾			83
1		1	0
2		2	0
3		3	1
4		4	2
5		5	3
6		6	4
7		7	5
8		8	6
9		9	7
10		10	8
11		11	9
12	1	1	10

Plumb Cut Rftr.	4 x 9/16
Side Cut Rftr.	4 x 4 1/16
Plumb Cut Hip	4 x 3/8
Side Cut Hip	4 x 4 1/16
Down Cut Purl.	4 x 5/16
Side Cut Purl.	4 x 3 31/32

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	6
2	2	10	12
3	4	3	18
4	5	8	24
5	7	1	30
6	8	6	36
7	9	11	42
8	11	4	48
9	12	9	54
10	14	2	60
11	15	7	66
12	17	0	72
13	18	5	78
14	19	10	84
15	21	3	90
16	22	8	96
17	24	2	2
18	25	7	8
19	27	0	14
20	28	5	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			35
½			72
¾		1	7
1		1	42
2		2	84
3		4	26
4		5	68
5		7	10
6		8	52
7		9	94
8		11	36
9	1	0	78
10	1	2	20
11	1	3	63
12	1	5	6

Creeper Rafters 1ft. 6 1/8 in. shorter each pair for 1ft. 6in. spacing.

1 ft. 9 in. RISE to 12 ft. RUN. 7¾ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	13
2	2	0	26
3	3	0	39
4	4	0	52
5	5	0	65
6	6	0	79
7	7	0	91
8	8	1	4
9	9	1	17
10	10	1	30
11	11	1	43
12	12	1	56
13	13	1	69
14	14	1	82
15	15	1	95
16	16	2	8
17	17	2	21
18	18	2	34
19	19	2	47
20	20	2	60

Half Span Ins.	Ft.	Ins.	Hts
¼			25
½			50
¾			75
1		1	1
2		2	2
3		3	3
4		4	4
5		5	5
6		6	6
7		7	7
8		8	8
9		9	9
10		10	10
11		11	11
12	1	0	13

Plumb Cut Rftr.	4 x ⅜
Side Cut Rftr.	4 x 4 1/16
Plumb Cut Hip	4 x 7/16
Side Cut Hip	4 x 4 1/16
Down Cut Purl.	4 x 5/16
Side Cut Purl.	4 x 3 11/32

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts
1	1	5	9
2	2	10	18
3	4	3	27
4	5	8	36
5	7	1	45
6	8	6	54
7	9	11	63
8	11	4	72
9	12	9	81
10	14	2	90
11	15	7	99
12	17	1	8
13	18	6	17
14	19	11	26
15	21	4	35
16	22	9	44
17	24	2	53
18	25	7	62
19	27	0	71
20	28	5	80

Half Span Ins.	Ft.	Ins.	Hts.
¼			35
½			70
¾		1	5
1		1	42
2		2	84
3		4	27
4		5	70
5		7	12
6		8	52
7		9	96
8		11	38
9	1	0	80
10	1	2	23
11	1	3	66
12	1	5	9

Creeper Rafters 1ft 5 5/16 in. shorter each pair for 1ft. 6in. spacing.

1/12th Pitch. 2 ft. RISE to 12 ft. RUN. 9 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	17
2	2	0	34
3	3	0	51
4	4	0	68
5	5	0	85
6	6	1	2
7	7	1	19
8	8	1	36
9	9	1	53
10	10	1	70
11	11	1	87
12	12	2	4
13	13	2	21
14	14	2	38
15	15	2	55
16	16	2	72
17	17	2	89
18	18	3	6
19	19	3	23
20	20	3	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			25
1/2			50
3/4			75
1		1	1
2		2	3
3		3	4
4		4	5
5		5	6
6		6	7
7		7	9
8		8	10
9		9	11
10		10	13
11		11	15
12	1	0	17

Plumb Cut Rftr.	4 x 11/16
Side Cut Rftr.	4 x 4 1/8
Plumb Cut Hip	4 x 1/2
Side Cut Hip	4 x 4 3/32
Down Cut Purl.	4 x 1/4
Side Cut Purl.	4 x 3 15/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	12
2	2	10	24
3	4	3	36
4	5	8	48
5	7	1	60
6	8	6	72
7	9	11	84
8	11	4	96
9	12	10	8
10	14	3	20
11	15	8	32
12	17	1	44
13	18	6	56
14	19	11	68
15	21	4	80
16	22	9	92
17	24	3	4
18	25	8	28
19	27	1	17
20	28	6	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			35
1/2			70
3/4		1	5
1		1	42
2		2	85
3		4	27
4		5	70
5		7	12
6		8	56
7		9	99
8		11	42
9	1	0	85
10	1	2	27
11	1	3	70
12	1	5	12

Creeper Rafters 1ft. 6 1/4in. shorter each pair for 1ft. 6in. spacing.

2 ft. 3 in. RISE to 12 ft. RUN. 10½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	22
2	2	0	44
3	3	0	66
4	4	0	88
5	5	1	10
6	6	1	32
7	7	1	54
8	8	1	76
9	9	1	98
10	10	2	20
11	11	2	42
12	12	2	64
13	13	2	86
14	14	3	8
15	15	3	20
16	16	3	54
17	17	3	74
18	18	3	96
19	19	4	18
20	20	4	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			25
½			50
¾			76
1		1	2
2		2	3
3		3	5
4		4	6
5		5	8
6		6	10
7		7	12
8		8	14
9		9	16
10		10	18
11		11	20
12	1	0	22

Plumb Cut Rftr.	4 x 1 13/16
Side Cut Rftr.	4 x 4 1/8
Plumb Cut Hip	4 x 9/16
Side Cut Hip	4 x 4 3/16
Down Cut Purl.	4 x ¾
Side Cut Purl.	4 x 3 15/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	15
2	2	10	30
3	4	3	45
4	5	8	60
5	7	1	75
6	8	6	90
7	10	0	5
8	11	5	20
9	12	10	35
10	14	3	50
11	15	8	65
12	17	1	80
13	18	6	95
14	20	0	10
15	21	5	25
16	22	10	40
17	24	3	65
18	25	8	80
19	27	1	95
20	28	7	10

Half Span Ins.	Ft.	Ins.	Hts.
¼			36
½			72
¾		1	8
1		1	43
2		2	86
3		4	29
4		5	72
5		7	15
6		8	58
7		10	2
8		11	45
9	1	0	88
10	1	2	30
11	1	3	73
12	1	5	15

Creeper Rafters 1ft. 6 5/16 in. shorter each pair for 1ft. 6in. spacing

2 ft. 6 in. RISE to 12 ft. RUN. 11½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	27
2	2	0	54
3	3	0	81
4	4	1	8
5	5	1	35
6	6	1	62
7	7	1	89
8	8	2	16
9	9	2	43
10	10	2	70
11	11	2	97
12	12	3	24
13	13	3	51
14	14	3	78
15	15	4	5
16	16	4	33
17	17	4	60
18	18	5	87
19	19	5	14
20	20	5	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			25
½			51
¾			76
1		1	2
2		2	4
3		3	6
4		4	8
5		5	10
6		6	12
7		7	14
8		8	16
9		9	19
10		10	22
11		11	25
12	1	0	27

Plumb Cut Rftr.	4 x ⅞
Side Cut Rftr.	4 x 4⅛
Plumb Cut Hip	4 x ⅝
Side Cut Hip	4 x 4 3/32
Down Cut Purl	4 x 1 13/16
Side Cut Purl.	4 x 3 15/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	18
2	2	10	36
3	4	3	54
4	5	8	72
5	7	1	90
6	8	7	8
7	10	0	26
8	11	5	44
9	12	10	62
10	14	3	80
11	15	9	98
12	17	2	16
13	18	7	34
14	20	0	52
15	21	5	70
16	22	10	88
17	24	4	6
18	25	9	24
19	27	2	42
20	28	7	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			36
½			72
¾		1	8
1		1	43
2		2	86
3		4	30
4		5	73
5		7	16
6		8	60
7		10	3
8		11	47
9	1	0	90
10	1	2	33
11	1	3	76
12	1	5	18

Creeper Rafters 1ft. 6⅜in. shorter each pair for 1ft. 6in. spacing.

2 ft. 9 in. RISE to 12 ft. RUN. 12¾ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	32
2	2	0	64
3	3	0	96
4	4	1	28
5	5	1	60
6	6	1	92
7	7	2	24
8	8	2	56
9	9	2	88
10	10	3	30
11	11	3	52
12	12	3	84
13	13	4	16
14	14	4	48
15	15	4	80
16	16	5	12
17	17	5	44
18	18	5	76
19	19	6	8
20	20	6	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			25
½			51
¾			76
1		1	2
2		2	4
3		3	6
4		4	9
5		5	12
6		6	15
7		7	18
8		8	21
9		9	24
10		10	26
11		11	29
12	1	0	32

Plumb Cut Rftr.	4 x 15/16
Side Cut Rftr.	4 x 4⅛
Plumb Cut Hip	4 x 11/16
Side Cut Hip	4 x 4 3/32
Down Cut Purl.	4 x ⅞
Side Cut Purl.	4 x 3 15/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	22
2	2	10	44
3	4	3	66
4	5	8	88
5	7	2	10
6	8	7	32
7	10	0	54
8	11	5	76
9	12	10	98
10	14	4	20
11	15	9	44
12	17	2	66
13	18	7	88
14	20	1	10
15	21	6	32
16	22	11	54
17	23	4	76
18	25	9	98
19	27	3	20
20	28	8	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			36
½			72
¾		1	8
1		1	43
2		2	86
3		4	29
4		5	72
5		7	15
6		8	58
7		10	2
8		11	46
9	1	1	89
10	1	2	33
11	1	3	77
12	1	5	22

Creeper Rafters 1ft. 6½in. shorter each pair for 1ft. 6in. spacing.

¼th Pitch. 3 ft. RISE to 12 ft. RUN. 14 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	37
2	2	0	74
3	3	1	11
4	4	1	48
5	5	1	85
6	6	2	22
7	7	2	59
8	8	2	96
9	9	3	33
10	10	3	70
11	11	4	7
12	12	4	44
13	13	4	81
14	14	5	18
15	15	5	55
16	16	5	92
17	17	6	29
18	18	6	66
19	19	7	3
20	20	7	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			25
½			51
¾			76
1		1	3
2		2	6
3		3	9
4		4	12
5		5	15
6		6	18
7		7	21
8		8	24
9		9	27
10		10	30
11		11	33
12	1	0	37

Plumb Cut Rftr.	4 x 1
Side Cut Rftr.	4 x 4 3/16
Plumb Cut Hip	4 x ¾
Side Cut Hip	4 x 4⅛
Down Cut Purl.	4 x 1
Side Cut Purl.	4 x 3 7/8

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	26
2	2	10	52
3	4	3	78
4	5	9	4
5	7	2	30
6	8	7	56
7	10	0	82
8	11	6	8
9	12	11	34
10	14	4	60
11	15	9	86
12	17	3	12
13	18	8	38
14	20	1	69
15	21	6	90
16	23	0	16
17	24	5	42
18	25	10	68
19	27	3	94
20	28	9	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			36
½			72
¾		1	8
1		1	43
2		2	86
3		4	30
4		5	76
5		7	18
6		8	62
7		10	6
8		11	50
9	1	0	94
10	1	2	38
11	1	3	72
12	1	5	26

Creeper Rafters 1ft. 6 9/16 in. shorter each pair for 1ft. 6in. spacing.

3 ft. 3 in. RISE to 12 ft. RUN. 15 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	44
2	2	0	88
3	3	1	33
4	4	1	76
5	5	2	20
6	6	2	64
7	7	3	8
8	8	3	52
9	9	3	96
10	10	4	40
11	11	4	84
12	12	5	28
13	13	5	72
14	14	6	16
15	15	6	60
16	16	7	4
17	17	7	48
18	18	7	92
19	19	8	36
20	20	8	80

Half Span Ins.	Ft.	Ins.	Hts.
¼			25
½			51
¾			79
1		1	3
2		2	6
3		3	9
4		4	12
5		5	16
6		6	20
7		7	24
8		8	28
9		9	32
10		10	36
11		11	40
12	1	0	44

Plumb Cut Rftr.	4 x 1 1/16
Side Cut Rftr.	4 x 4 3/16
Plumb Cut Hip	4 x 4 13/16
Side Cut Hip	4 x 4 1/8
Down Cut Purl.	4 x 4 1/8
Side Cut Purl.	4 x 3 7/8

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	31
2	2	10	62
3	4	3	93
4	5	9	24
5	7	2	55
6	8	7	86
7	10	1	17
8	11	6	48
9	12	11	79
10	14	5	10
11	15	10	41
12	17	3	72
13	18	9	3
14	20	2	34
15	21	7	65
16	23	0	96
17	24	6	27
18	25	11	58
19	27	4	89
20	28	10	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			36
½			72
¾		1	8
1		1	44
2		2	88
3		4	32
4		5	76
5		7	20
6		8	64
7		10	8
8		11	52
9	1	0	96
10	1	2	41
11	1	3	87
12	1	5	31

Creeper Rafters 1ft. 6 5/8in. shorter each pair for 1ft. 6in. spacing.

3 ft. 6 in. RISE to 12 ft. RUN. 16 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts
1	1	0	51
2	2	1	2
3	3	1	53
4	4	2	4
5	5	2	55
6	6	3	6
7	7	3	57
8	8	4	8
9	9	4	59
10	10	5	10
11	11	5	61
12	12	6	12
13	13	6	63
14	14	7	14
15	15	7	65
16	16	8	16
17	17	8	67
18	18	9	18
19	19	9	69
20	20	10	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			26
½			52
¾			78
1		1	4
2		2	8
3		3	12
4		4	16
5		5	20
6		6	24
7		7	28
8		8	32
9		9	36
10		10	40
11		11	46
12	1	0	51

Plumb Cut Rftr.	4 x 1⅛
Side Cut Rftr.	4 x 4 3/16
Plumb Cut Hip	4 x ⅞
Side Cut Hip	4 x 4⅛
Down Cut Purl.	4 x 1¼
Side Cut Purl.	4 x 3⅞

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	36
2	2	10	72
3	4	4	8
4	5	9	44
5	7	2	80
6	8	8	16
7	10	1	52
8	11	6	88
9	13	0	24
10	14	5	60
11	15	10	96
12	17	4	32
13	18	9	68
14	20	3	4
15	21	8	40
16	23	1	76
17	24	7	12
18	26	0	48
19	27	5	81
20	28	11	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			36
½			72
¾		1	8
1		1	44
2		2	88
3		4	22
4		5	76
5		7	20
6		8	65
7		10	10
8		11	55
9	1	1	0
10	1	2	45
11	1	3	90
12	1	5	36

Creeper Rafters 1ft. 6¾in. shorter each pair for 1ft. 6in. spacing.

3 ft. 9 in. RISE to 12 ft. RUN. 17 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	58
2	2	1	16
3	3	1	74
4	4	2	32
5	5	2	90
6	6	3	48
7	7	4	6
8	8	4	64
9	9	5	22
10	10	5	80
11	11	6	38
12	12	6	96
13	13	7	56
14	14	8	12
15	15	8	70
16	16	8	28
17	17	9	86
18	18	10	44
19	19	11	2
20	20	11	60

Half Span Ins.	Ft.	Ins.	Hts.
½			26
1			52
1½			78
2		1	4
3		2	8
4		3	13
5		4	18
6		5	23
7		6	28
8		7	33
9		8	38
10		9	43
11		10	48
12		11	53
	1	0	58

Plumb Cut Rftr.	4 x 1 5/16
Side Cut Rftr.	4 x 4 3/16
Plumb Cut Hip	4 x 1 15/16
Side Cut Hip	4 x 4 1/16
Down Cut Purl.	4 x 1¼
Side Cut Purl.	4 x 3 7/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	41
2	2	10	82
3	4	4	23
4	5	9	64
5	7	3	5
6	8	8	46
7	10	1	87
8	11	7	28
9	13	0	69
10	14	6	10
11	15	11	51
12	17	4	92
13	18	10	33
14	20	3	74
15	21	9	15
16	23	2	56
17	24	7	97
18	26	1	38
19	27	6	79
20	29	0	20

Half Span Ins.	Ft.	Ins.	Hts.
½			36
1			72
1½		1	9
1		1	45
2		2	90
3		4	35
4		5	80
5		7	25
6		8	70
7		10	15
8		11	60
9	1	1	5
10	1	2	50
11	1	3	95
12	1	5	41

Creeper Rafters 1ft. 6⅞in. shorter each pair for 1ft. 6in. spacing.

1/6th Pitch. 4 ft. RISE to 12 ft. RUN. 18 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	65
2	2	1	30
3	3	1	95
4	4	2	64
5	5	3	25
6	6	3	90
7	7	4	55
8	8	5	20
9	9	5	85
10	10	6	50
11	11	7	15
12	12	7	80
13	13	8	45
14	14	9	10
15	15	9	75
16	16	10	40
17	17	11	5
18	18	11	70
19	20	0	35
20	21	1	0

Half Span Ins.	Ft.	Ins.	Hts.
1/4			26
1/2			52
3/4			79
1		1	5
2		2	10
3		3	15
4		4	20
5		5	25
6		6	30
7		7	35
8		8	41
9		9	47
10		10	53
11		11	59
12	1	0	65

Plumb Cut Rftr.	4 x 1 7/16
Side Cut Rftr.	4 x 4 5/16
Plumb Cut Hip	4 x 1
Side Cut Hip	4 x 4 3/16
Down Cut Purl.	4 x 1 3/8
Side Cut Purl.	4 x 3 13/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	46
2	2	10	92
3	4	4	38
4	5	9	84
5	7	3	30
6	8	8	76
7	10	2	22
8	11	7	68
9	13	1	14
10	14	6	60
11	16	0	6
12	17	5	52
13	18	10	98
14	20	4	44
15	21	9	90
16	23	3	36
17	24	8	82
18	26	2	28
19	27	7	44
20	29	1	20

Half Span Ins.	Ft.	Ins.	Hts.
1/4			36
1/2			73
3/4		1	8
1		1	45
2		2	90
3		4	35
4		5	80
5		7	25
6		8	70
7		10	16
8		11	62
9	1	1	8
10	1	2	54
11	1	4	0
12	1	5	46

Creeper Rafters 1ft. 7 1/8in. shorter each pair for 1ft. 6in. spacing.

4 ft. 3 in. RISE to 12 ft. RUN. 19 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	74
2	2	1	48
3	3	2	22
4	4	2	96
5	5	3	70
6	6	4	44
7	7	5	18
8	8	5	92
9	9	6	66
10	10	7	40
11	11	8	14
12	12	8	88
13	13	9	62
14	14	10	36
15	15	11	10
16	16	11	84
17	18	0	58
18	19	1	32
19	20	2	6
20	21	2	80

Half Span Ins.	Ft.	Ins.	Hts.
¼			26
½			52
¾			80
1		1	6
2		2	12
3		3	18
4		4	24
5		5	30
6		6	36
7		7	42
8		8	48
9		9	54
10		10	60
11		11	67
12	1	0	74

Plumb Cut Rftr.	4 x 1½
Side Cut Rftr.	4 x 4 5/16
Plumb Cut Hip	4 x 1
Side Cut Hip	4 x 4 3/16
Down Cut Purl.	4 x 1 7/16
Side Cut Purl.	4 x 3 13/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	52
2	2	11	4
3	4	4	56
4	5	10	8
5	7	3	60
6	8	9	12
7	10	2	64
8	11	8	16
9	13	1	68
10	14	7	20
11	16	0	72
12	17	6	24
13	18	11	76
14	20	5	28
15	21	10	80
16	23	4	32
17	24	9	84
18	26	3	36
19	27	8	88
20	29	2	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			36
½			73
¾		1	9
1		1	46
2		2	92
3		4	38
4		5	84
5		7	30
6		8	76
7		10	22
8		11	68
9	1	1	14
10	1	2	60
11	1	4	6
12	1	5	52

Creeper Rafters 1ft. 7½in. shorter each pair for 1ft. 6in. spacing.

4 ft. 6 in. RISE to 12 ft. RUN. 20 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	83
2	2	1	66
3	3	2	49
4	4	3	32
5	5	4	15
6	6	4	98
7	7	5	81
8	8	6	64
9	9	7	47
10	10	8	30
11	11	9	13
12	12	9	96
13	13	10	79
14	14	11	62
15	16	0	45
16	17	1	28
17	18	2	11
18	19	2	94
19	20	3	77
20	21	4	60

Half Span Ins.	Ft.	Ins.	Hts.
1/4			26
1/2			53
3/4			79
1		1	6
2		2	13
3		3	20
4		4	27
5		5	34
6		6	41
7		7	48
8		8	55
9		9	62
10		10	69
11		11	76
12	1	0	83

Plumb Cut Rftr.	4 x 1 9/16
Side Cut Rftr.	4 x 4 5/16
Plumb Cut Hip	4 x 1 1/8
Side Cut Hip	4 x 4 3/16
Down Cut Purl.	4 x 1 1/2
Side Cut Purl.	4 x 3 13/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	58
2	2	11	16
3	4	4	74
4	5	10	32
5	7	3	90
6	8	9	48
7	10	3	6
8	11	8	64
9	13	2	22
10	14	7	80
11	16	1	38
12	17	6	96
13	19	0	54
14	20	6	12
15	21	11	70
16	23	5	28
17	24	10	86
18	26	4	44
19	27	10	2
20	29	3	60

Half Span Ins.	Ft.	Ins.	Hts.
1/4			36
1/2			72
3/4		1	9
1		1	46
2		2	92
3		4	28
4		5	84
5		7	30
6		8	76
7		10	23
8		11	70
9	1	1	17
10	1	2	64
11	1	4	11
12	1	5	58

Creeper Rafters 1 ft. 7 1/4 in. shorter each pair for 1 ft. 6 in. spacing.

4 ft. 9 in. RISE to 12 ft. RUN. 21 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	0	92
2	2	1	84
3	3	2	76
4	4	3	68
5	5	4	60
6	6	5	52
7	7	6	44
8	8	7	36
9	9	8	28
10	10	9	20
11	11	10	12
12	12	11	4
13	13	9	96
14	15	0	88
15	16	1	80
16	17	2	72
17	18	3	64
18	19	4	56
19	20	5	48
20	21	6	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			26
1/2			53
3/4			80
1		1	7
2		2	14
3		3	21
4		4	28
5		5	36
6		6	44
7		7	52
8		8	60
9		9	68
10		10	76
11		11	84
12	1	0	92

Plumb Cut Rftr.	4 x 1 5/8
Side Cut Rftr.	4 x 4 3/8
Plumb Cut Hip	4 x 1 3/16
Side Cut Hip	4 x 4 3/16
Down Cut Purl.	4 x 1 9/16
Side Cut Purl.	4 x 3 13/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	65
2	2	11	30
3	4	4	95
4	5	10	60
5	7	4	25
6	8	9	90
7	10	3	55
8	11	9	20
9	13	2	85
10	14	8	50
11	16	2	15
12	17	7	30
13	19	1	45
14	20	7	10
15	22	0	75
16	23	6	40
17	25	0	5
18	26	5	70
19	27	11	35
20	29	5	0

Half Span Ins.	Ft.	Ins.	Hts.
1/4			36
1/2			73
3/4		1	10
1		1	47
2		2	94
3		4	41
4		5	89
5		7	36
6		8	82
7		10	29
8		11	76
9	1	1	23
10	1	2	70
11	1	4	19
12	1	5	65

Creeper Rafters 1ft. 7 3/8in. shorter each pair for 1ft. 6in. spacing.

5/24th Pitch. 5 ft. RISE to 12 ft. RUN. 22 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	0
2	2	2	0
3	3	3	0
4	4	4	0
5	5	5	0
6	6	6	0
7	7	7	0
8	8	8	0
9	9	9	0
10	10	10	0
11	11	11	0
12	13	0	0
13	14	1	0
14	15	2	0
15	16	3	0
16	17	4	0
17	18	5	0
18	19	6	0
19	20	7	0
20	21	8	0

Half Span Ins.	Ft.	Ins.	Hts.
1/4			27
1/2			54
3/4			81
1		1	8
2		2	16
3		3	24
4		4	32
5		5	40
6		6	48
7		7	56
8		8	64
9		9	73
10		10	82
11		11	91
12	1	1	0

Plumb Cut Rftr.	4 x 1 11/16
Side Cut Rftr.	4 x 4 7/16
Plumb Cut Hip	4 x 1 1/4
Side Cut Hip	4 x 4 1/4
Down Cut Purl.	4 x 1 5/8
Side Cut Purl.	4 x 3 3/4

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	72
2	2	11	44
3	4	5	16
4	5	10	88
5	7	4	60
6	8	10	32
7	10	4	4
8	11	9	76
9	13	3	48
10	14	9	20
11	16	2	92
12	17	8	64
13	19	2	36
14	20	8	8
15	22	1	80
16	23	7	52
17	25	1	24
18	26	6	96
19	28	0	68
20	29	6	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			36
1/2			73
3/4		1	10
1		1	47
2		2	94
3		4	41
4		5	88
5		7	36
6		8	84
7		10	32
8		11	80
9	1	1	28
10	1	2	76
11	1	4	24
12	1	5	72

Creeper Rafters 1ft. 7½in. shorter each pair for 1ft. 6in. spacing.

5 ft. 3 in. RISE to 12 ft. RUN. 23 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	11
2	2	2	22
3	3	3	33
4	4	4	44
5	5	5	55
6	6	6	66
7	7	7	77
8	8	8	88
9	9	9	99
10	10	11	10
11	12	0	21
12	13	1	32
13	14	2	43
14	15	3	54
15	16	4	65
16	17	5	76
17	18	6	87
18	19	7	98
19	20	9	9
20	21	10	20

Half Span Ins.	Ft.	Ins.	Hts.
1/4			27
1/2			55
3/4			83
1		1	9
2		2	18
3		3	27
4		4	36
5		5	45
6		6	54
7		7	63
8		8	72
9		9	81
10		10	91
11	1	0	1
12	1	1	11

Plumb Cut Rftr.	4 x 1 13/16
Side Cut Rftr.	4 x 4 7/16
Plumb Cut Hip	4 x 1 5/16
Side Cut Hip	4 x 4 1/4
Down Cut Purl.	4 x 1 11/16
Side Cut Purl.	4 x 3 3/4

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	79
2	2	11	58
3	4	5	37
4	5	11	16
5	7	4	95
6	8	10	74
7	10	4	53
8	11	10	32
9	13	4	11
10	14	9	90
11	16	3	69
12	17	9	48
13	19	3	27
14	20	9	6
15	22	2	85
16	23	8	64
17	25	2	43
18	26	8	22
19	28	2	1
20	29	7	80

Half Span Ins.	Ft.	Ins.	Hts.
1/4			37
1/2			74
3/4		1	11
1		1	48
2		2	96
3		4	44
4		5	92
5		7	40
6		8	88
7		10	36
8		11	84
9	1	1	32
10	1	2	81
11	1	4	30
12	1	5	79

Creeper Rafters 1ft. 7 9/16 in. shorter each pair for 1ft. 6in. spacing

5 ft. 6 in. RISE to 12 ft. RUN. 24 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	22
2	2	2	44
3	3	3	66
4	4	4	88
5	5	6	10
6	6	7	32
7	7	8	54
8	8	9	76
9	9	10	98
10	11	0	20
11	12	1	42
12	13	2	64
13	14	3	86
14	15	5	8
15	16	6	30
16	17	7	52
17	18	8	74
18	19	9	96
19	20	11	18
20	22	0	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			26
½			54
¾			82
1		1	10
2		2	20
3		3	30
4		4	40
5		5	50
6		6	60
7		7	70
8		8	80
9		9	90
10		11	0
11	1	0	11
12	1	1	22

Plumb Cut Rftr.	4 x 1⅞
Side Cut Rftr.	4 x 4½
Plumb Cut Hip	4 x 1⅜
Side Cut Hip	4 x 1¼
Down Cut Purl.	4 x 1¾
Side Cut Purl.	4 x 3¾

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	86
2	2	11	72
3	4	5	58
4	5	11	44
5	7	5	30
6	8	11	16
7	10	5	2
8	11	10	88
9	13	4	74
10	14	10	60
11	15	4	46
12	17	10	32
13	19	4	18
14	20	10	4
15	22	3	90
16	23	9	76
17	25	3	62
18	26	9	48
19	28	3	34
20	29	9	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			37
½			74
¾		1	10
1		1	49
2		2	98
3		4	47
4		4	96
5		7	43
6		8	92
7		10	41
8		11	90
9	1	1	39
10	1	2	88
11	1	4	37
12	1	5	86

Creeper Rafters 1ft. 7⅞in. shorter each pair for 1ft. 6in. spacing.

5 ft. 9 in. RISE to 12 ft. RUN. 25 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	32
2	2	2	64
3	3	3	96
4	4	5	28
5	5	6	60
6	6	7	92
7	7	9	24
8	8	10	56
9	9	11	88
10	11	1	20
11	12	2	52
12	13	3	84
13	14	5	16
14	15	6	48
15	16	7	80
16	17	9	12
17	18	10	44
18	19	11	76
19	21	1	8
20	22	2	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			27
1/2			55
3/4			83
1		1	11
2		2	22
3		3	33
4		4	44
5		5	55
6		6	66
7		7	77
8		8	88
9		9	99
10		11	10
11	1	0	20
12	1	1	32

Plumb Cut Rftr.	4 x 1 15/16
Side Cut Rftr.	4 x 4 1/2
Plumb Cut Hip	4 x 1 3/8
Side Cut Hip	4 x 4 1/4
Down Cut Purl.	4 x 1 13/16
Side Cut Purl.	4 x 3 3/4

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	94
2	2	11	88
3	4	5	82
4	5	11	76
5	7	5	70
6	8	11	64
7	10	5	58
8	11	11	52
9	13	5	46
10	14	11	40
11	16	5	30
12	17	11	28
13	19	5	22
14	20	11	16
15	22	5	10
16	23	11	4
17	25	4	98
18	26	10	92
19	28	4	86
20	29	10	80

Half Span Ins.	Ft.	Ins.	Hts.
1/4			38
1/2			77
3/4		1	16
1		1	49
2		2	98
3		4	47
4		5	96
5		7	45
6		8	94
7		10	44
8		11	94
9	1	1	44
10	1	2	94
11	1	4	44
12	1	5	94

Creeper Rafters 1ft. 8in. shorter each pair for 1ft. 6in. spacing

¼ Pitch. 6 ft. RISE to 12 ft. RUN. 26 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	1	42	¼			26
2	2	2	84	½			54
3	3	4	26	¾			82
4	4	5	68	1		1	11
5	5	7	10	2		2	22
6	6	8	52	3		3	34
7	7	9	94	4		4	47
8	8	11	36	5		5	58
9	10	0	78	6		6	70
10	11	2	20	7		7	82
11	12	3	62	8		8	94
12	13	5	4	9		10	6
13	14	6	46	10		11	18
14	15	7	88	11	1	0	30
15	16	9	30	12	1	1	42
16	17	10	72				
17	19	0	14				
18	20	1	56				
19	21	2	98				
20	22	4	40				

Plumb Cut Rftr.	4 x 2
Side Cut Rftr.	4 x 4 9/16
Plumb Cut Hip	4 x 1 7/16
Side Cut Hip	4 x 4 5/16
Down Cut Purl.	4 x 1 7/8
Side Cut Purl	4 x 3 11/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	6	3	¼			38
2	3	0	6	½			76
3	4	6	9	¾		1	14
4	6	0	12	1		1	50
5	7	6	15	2		3	0
6	9	0	18	3		4	50
7	10	6	21	4		6	0
8	12	0	24	5		7	50
9	13	6	27	6		9	0
10	15	0	30	7		10	50
11	16	6	33	8	1	0	0
12	18	0	36	9	1	1	51
13	19	6	39	10	1	3	2
14	21	0	42	11	1	4	52
15	22	6	45	12	1	6	3
16	24	0	48				
17	25	6	51				
18	27	0	54				
19	28	6	57				
20	30	0	60				

Creeper Rafters 1ft. 8⅛in. shorter each pair for 1ft. 6in. spacing.

6 ft. 3 in. RISE to 12 ft. RUN. 27 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	53
2	2	3	6
3	3	4	59
4	4	6	12
5	5	7	65
6	6	9	18
7	7	10	71
8	9	0	24
9	10	1	77
10	11	3	30
11	12	4	83
12	13	6	36
13	14	7	89
14	15	9	42
15	16	10	95
16	18	0	48
17	19	2	1
18	20	3	54
19	21	5	7
20	22	6	60

Half Span Ins.	Ft.	Ins.	Hts.
1/4			28
1/2			56
3/4			84
1		1	12
2		2	24
3		3	36
4		4	48
5		5	62
6		6	76
7		7	89
8		9	2
9		10	15
10		11	28
11	1	0	41
12	1	1	53

Plumb Cut Rftr.	4 x 2 1/16
Side Cut Rftr.	4 x 4 9/16
Plumb Cut Hip	4 x 1 7/16
Side Cut Hip	4 x 4 5/16
Down Cut Purl.	4 x 1 29/32
Side Cut Purl	4 x 3 11/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	11
2	3	0	22
3	4	6	33
4	6	0	44
5	7	6	55
6	9	0	66
7	10	6	77
8	12	0	88
9	13	6	99
10	15	1	10
11	16	7	21
12	18	1	32
13	19	7	43
14	21	1	54
15	22	7	65
16	24	1	76
17	25	7	87
18	27	1	98
19	28	8	9
20	30	2	20

Half Span Ins.	Ft.	Ins.	Hts.
1/4			38
1/2			76
3/4		1	14
1		1	50
2		3	1
3		4	51
4		6	2
5		7	53
6		9	4
7		10	55
8	1	0	6
9	1	1	57
10	1	3	8
11	1	4	59
12	1	6	11

Creeper Rafters 1ft. 8 5/16 in. shorter each pair for 1ft. 6in. spacing.

6 ft. 6 in. RISE to 12 ft. RUN. 28 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	65
2	2	3	30
3	3	4	95
4	4	6	60
5	5	8	25
6	6	9	90
7	7	11	55
8	9	1	20
9	10	2	85
10	11	4	50
11	12	6	15
12	13	7	80
13	14	9	45
14	15	11	10
15	17	0	75
16	18	2	40
17	19	4	5
18	20	5	70
19	21	7	35
20	22	9	0

Half Span Ins.	Ft.	Ins.	Hts.
1/4			28
1/2			56
3/4			85
1		1	13
2		2	26
3		3	39
4		4	53
5		5	67
6		6	81
7		7	95
8		9	9
9		10	23
10		11	37
11	1	0	51
12	1	1	65

Plumb Cut Rftr.	4 x 2 1/8
Side Cut Rftr.	4 x 4 3/8
Plumb Cut Hip	4 x 1 9/16
Side Cut Hip	4 x 4 5/16
Down Cut Purl.	4 x 1 15/16
Side Cut Purl.	4 x 3 11/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	20
2	3	0	40
3	4	6	60
4	6	0	80
5	7	7	0
6	9	1	20
7	10	7	40
8	12	1	60
9	13	7	80
10	15	2	0
11	16	8	20
12	18	2	40
13	19	8	60
14	21	2	80
15	22	9	0
16	24	2	20
17	25	9	40
18	27	3	60
19	28	9	80
20	30	4	0

Half Span Ins.	Ft.	Ins.	Hts.
1/4			38
1/2			76
3/4		1	14
1		1	51
2		3	2
3		4	53
4		6	4
5		7	56
6		9	8
7		10	60
8	1	0	12
9	1	1	64
10	1	3	16
11	1	4	68
12	1	6	20

Creeper Rafters
1ft. 8 1/16 in. **shorter**
each pair for
1ft. 6in. spacing.

6 ft. 9 in. RISE to 12 ft. RUN. 29 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	77
2	2	3	54
3	3	5	31
4	4	7	8
5	5	8	85
6	6	10	62
7	8	0	39
8	9	2	16
9	10	3	93
10	11	5	70
11	12	7	47
12	13	9	24
13	14	11	1
14	16	0	78
15	17	2	55
16	18	4	32
17	19	6	9
18	20	7	86
19	21	9	63
20	22	11	40

Half Span Ins.	Ft.	Ins.	Hts.
½			28
1			56
1½			84
2		1	13
3		2	26
4		3	40
5		4	55
6		5	70
7		6	85
8		8	0
9		9	15
10		10	30
11		11	45
12	1	0	61
	1	1	77

Plumb Cut Rftr.	4 x 2 3/16
Side Cut Rftr.	4 x 4 5/8
Plumb Cut Hip	4 x 1 5/8
Side Cut Hip	4 x 4 5/16
Down Cut Purl.	4 x 1 31/32
Side Cut Purl.	4 x 3 5/8

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	29
2	3	0	58
3	4	6	87
4	6	1	16
5	7	7	45
6	9	1	74
7	10	8	3
8	12	2	32
9	13	8	61
10	15	2	90
11	16	9	19
12	18	3	48
13	19	9	77
14	21	4	6
15	22	10	35
16	24	4	64
17	25	10	93
18	27	5	22
19	28	11	51
20	30	5	80

Half Span Ins.	Ft.	Ins.	Hts.
¼			38
½			76
¾		1	15
1		1	52
2		3	4
3		4	56
4		6	8
5		7	60
6		9	12
7		10	64
8	1	0	17
9	1	1	70
10	1	3	23
11	1	4	76
12	1	6	29

Creeper Rafters 1ft. 8⅝in. shorter each pair for 1ft. 6in. spacing.

7/24th Pitch. 7 ft. RISE to 12 ft. RUN. 30 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	1	89
2	2	3	78
3	3	5	67
4	4	7	56
5	5	9	45
6	6	11	34
7	8	1	23
8	9	3	12
9	10	5	1
10	11	6	90
11	12	8	99
12	13	10	68
13	15	0	57
14	16	2	46
15	17	4	35
16	18	6	24
17	19	8	13
18	20	10	2
19	21	11	91
20	23	1	80

Half Span Ins.	Ft.	Ins.	Hts.
1/4			29
1/2			58
3/4			87
1		1	15
2		2	30
3		3	45
4		4	61
5		5	77
6		6	93
7		8	9
8		9	25
9		10	41
10		11	57
11	1	0	73
12	1	1	89

Plumb Cut Rftr.	4 x 2 5/16
Side Cut Rftr.	4 x 4 11/16
Plumb Cut Hip	4 x 1 3/4
Side Cut Hip	4 x 4 3/8
Down Cut Purl.	4 x 2
Side Cut Purl.	4 x 3 5/8

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	38
2	3	0	76
3	4	7	14
4	6	1	52
5	7	7	90
6	9	2	28
7	10	8	66
8	12	3	4
9	13	9	42
10	15	3	80
11	16	10	18
12	18	4	56
13	19	10	94
14	21	5	32
15	22	11	70
16	24	6	8
17	26	0	46
18	27	6	84
19	29	1	22
20	30	7	60

Half Span Ins.	Ft.	Ins.	Hts.
1/4			38
1/2			76
3/4		1	14
1		1	53
2		3	6
3		4	59
4		6	12
5		7	65
6		9	18
7		10	71
8	1	0	24
9	1	1	77
10	1	3	30
11	1	4	84
12	1	6	38

Creeper Rafters 1ft. 8 7/8in. shorter each pair for 1ft. 6in. spacing.

7 ft. 3 in. RISE to 12 ft. RUN. 30¾ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	2	2
2	2	4	4
3	3	6	6
4	4	8	8
5	5	10	10
6	7	0	12
7	8	2	14
8	9	4	16
9	10	6	18
10	11	8	20
11	12	10	22
12	14	0	24
13	15	2	26
14	16	4	28
15	17	6	30
16	18	8	32
17	19	10	34
18	21	0	36
19	22	2	38
20	23	4	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			29
½			58
¾			87
1		1	16
2		2	32
3		3	48
4		4	65
5		5	82
6		6	99
7		8	16
8		9	33
9		10	50
10		11	67
11	1	1	84
12	1	2	2

Plumb Cut Rftr.	4 x 2⅞
Side Cut Rftr.	4 x 4 11/16
Plumb Cut Hip	4 x 1¾
Side Cut Hip	4 x 4⅜
Down Cut Purl.	4 x 2 1/16
Side Cut Purl.	4 x 3 9/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	48
2	3	0	96
3	4	7	44
4	6	1	92
5	7	8	40
6	9	2	88
7	10	9	36
8	12	3	84
9	13	10	32
10	15	4	80
11	16	11	28
12	18	5	76
13	20	0	24
14	21	6	72
15	23	1	20
16	24	7	68
17	26	2	16
18	27	8	64
19	29	3	12
20	30	9	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			38
½			76
¾		1	14
1		1	54
2		3	8
3		4	62
4		6	16
5		7	70
6		9	24
7		10	78
8	1	0	32
9	1	1	86
10	1	3	40
11	1	4	94
12	1	6	48

Creeper Rafters 1ft. 9in. shorter each pair for 1ft. 6in. spacing

7 ft. 6 in. RISE to 12 ft. RUN. 31½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	2	15
2	2	4	30
3	3	6	45
4	4	8	60
5	5	10	75
6	7	0	90
7	8	3	5
8	9	5	20
9	10	7	35
10	11	9	50
11	12	11	65
12	14	1	80
13	15	3	95
14	16	6	10
15	17	8	25
16	18	10	40
17	20	0	55
18	21	2	70
19	22	4	85
20	23	7	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			29
½			58
¾			88
1		1	17
2		2	35
3		3	53
4		4	71
5		5	89
6		7	7
7		8	25
8		9	43
9		10	61
10		11	79
11	1	0	97
12	1	2	15

Plumb Cut Rftr.	4 x 2½
Side Cut Rftr.	4 x 4¾
Plumb Cut Hip	4 x 1 13/16
Side Cut Hip	4 x 4⅜
Down Cut Purl.	4 x 2⅛
Side Cut Purl.	4 x 3½

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	58
2	3	1	16
3	4	7	74
4	6	2	32
5	7	8	90
6	9	3	48
7	10	10	6
8	12	4	64
9	13	11	22
10	15	5	80
11	17	0	38
12	18	6	96
13	20	1	54
14	21	8	12
15	23	2	70
16	24	9	28
17	26	3	86
18	27	10	44
19	29	5	2
20	30	11	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			39
½			78
¾		1	17
1		1	54
2		3	8
3		4	63
4		6	18
5		7	73
6		9	28
7		10	83
8	1	0	38
9	1	1	93
10	1	3	48
11	1	5	3
12	1	6	58

Creeper Rafters 1ft. 9¼in. shorter each pair for 1ft. 6in. spacing.

7 ft. 9 in. RISE to 12 ft. RUN. 32¼ deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	2	28
2	2	4	56
3	3	6	84
4	4	9	12
5	5	11	40
6	7	1	68
7	8	3	96
8	9	6	24
9	10	8	52
10	11	10	80
11	13	1	8
12	14	3	36
13	15	5	64
14	16	7	92
15	17	10	20
16	19	0	48
17	20	2	76
18	21	5	4
19	22	7	32
20	23	9	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			29
½			58
¾			87
1		1	19
2		2	38
3		3	57
4		4	76
5		5	95
6		7	14
7		8	33
8		9	52
9		10	71
10		11	90
11	1	1	9
12	1	2	28

Plumb Cut Rftr.	4 x 2⅝
Side Cut Rftr.	4 x 4 13/16
Plumb Cut Hip	4 x 1⅞
Side Cut Hip	4 x 4⅜
Down Cut Purl.	4 x 2¼
Side Cut Purl.	4 x 3½

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	68
2	3	1	36
3	4	8	4
4	6	2	72
5	7	9	40
6	9	4	8
7	10	10	76
8	12	5	44
9	14	0	12
10	15	6	80
11	17	1	48
12	18	8	16
13	20	2	84
14	21	9	52
15	23	4	20
16	24	10	88
17	26	5	56
18	28	0	24
19	29	6	92
20	31	1	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			39
½			78
¾		1	17
1		1	55
2		3	10
3		4	65
4		6	20
5		7	76
6		9	32
7		10	88
8	1	0	44
9	1	2	0
10	1	3	56
11	1	5	12
12	1	6	68

Creeper Rafters 1ft. 9 5/16 in. shorter each pair for 1ft. 6in. spacing.

1/3 Pitch. 8 ft. RISE to 12 ft. RUN. 33 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	2	42
2	2	4	84
3	3	7	26
4	4	9	68
5	6	0	10
6	7	2	52
7	8	4	94
8	9	7	36
9	10	9	78
10	12	0	20
11	13	2	62
12	14	5	4
13	15	7	46
14	16	9	88
15	18	0	30
16	19	2	72
17	20	5	14
18	21	7	56
19	22	9	98
20	24	0	40

Half Span Ins.	Ft	Ins.	Hts.
1/4			30
1/2			60
3/4			90
1		1	20
2		2	40
3		3	60
4		4	80
5		6	0
6		7	20
7		8	40
8		9	60
9		10	80
10	1	0	0
11	1	1	21
12	1	2	42

Plumb Cut Rftr.	4 x 2 11/16
Side Cut Rftr.	4 x 4 7/8
Plumb Cut Hip	4 x 1 13/16
Side Cut Hip	4 x 4 7/16
Down Cut Purl.	4 x 2 3/8
Side Cut Purl.	4 x 3 7/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	79
2	3	1	58
3	4	8	37
4	6	3	16
5	7	9	95
6	9	4	74
7	10	11	53
8	12	6	32
9	14	1	11
10	15	7	90
11	17	2	69
12	18	9	48
13	20	4	27
14	21	11	6
15	23	5	85
16	25	0	64
17	26	7	43
18	28	2	22
19	29	9	1
20	31	3	80

Half Span Ins.	Ft.	Ins.	Hts.
1/4			39
1/2			78
3/4		1	17
1		1	56
2		3	12
3		4	68
4		6	24
5		7	80
6		9	37
7		10	94
8	1	0	51
9	1	2	8
10	1	3	65
11	1	5	22
12	1	6	79

Creeper Rafters 1ft. 9 5/8in. shorter each pair for 1ft. 6in. spacing.

8 ft. 3 in. RISE to 12 ft. RUN. 33¾ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	2	56
2	2	5	12
3	3	7	68
4	4	10	14
5	6	0	80
6	7	3	36
7	8	5	92
8	9	8	48
9	10	11	4
10	12	1	60
11	13	4	16
12	14	6	72
13	15	9	28
14	16	11	84
15	18	2	40
16	19	4	96
17	20	7	52
18	21	10	8
19	23	0	64
20	24	3	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			30
½			60
¾			90
1		1	21
2		2	42
3		3	63
4		4	84
5		6	5
6		7	26
7		8	47
8		9	68
9		10	90
10	1	0	12
11	1	1	34
12	1	2	56

Plumb Cut Rftr.	4 x 2 13/16
Side Cut Rftr.	4 x 4 7/8
Plumb Cut Hip	4 x 1 15/16
Side Cut Hip	4 x 4 7/16
Down Cut Purl.	4 x 2 13/32
Side Cut Purl.	4 x 3 7/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	90
2	3	1	80
3	4	8	70
4	6	3	60
5	7	10	50
6	9	5	40
7	11	0	30
8	12	7	20
9	14	2	10
10	15	9	0
11	17	3	90
12	18	10	80
13	20	5	70
14	22	0	60
15	23	7	50
16	25	2	40
17	26	9	30
18	28	4	20
19	29	11	10
20	31	6	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			39
½			78
¾		1	17
1		1	57
2		3	14
3		4	71
4		6	28
5		7	85
6		9	42
7		11	0
8	1	0	58
9	1	2	16
10	1	3	74
11	1	5	32
12	1	6	90

Creeper Rafters 1ft. 9⅞in. shorter each pair for 1ft. 6in. spacing

8 ft. 6 in. RISE to 12 ft. RUN. 34½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	2	70
2	2	5	40
3	3	8	10
4	4	11	80
5	6	2	50
6	7	5	20
7	8	7	90
8	9	10	60
9	11	1	30
10	12	4	0
11	13	6	70
12	14	8	40
13	15	11	10
14	17	1	80
15	18	4	50
16	19	7	20
17	20	9	90
18	22	0	60
19	23	3	30
20	24	6	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			30
½			60
¾			91
1		1	22
2		2	44
3		3	66
4		4	88
5		6	10
6		7	32
7		8	55
8		9	78
9		11	1
10	1	0	24
11	1	1	47
12	1	2	70

Plumb Cut Rftr.	4 x 2 7/8
Side Cut Rftr.	4 x 4 15/16
Plumb Cut Hip	4 x 2
Side Cut Hip	4 x 4½
Down Cut Purl.	4 x 4 7/16
Side Cut Purl.	4 x 3 3/8

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	1
2	3	2	2
3	4	9	3
4	6	7	4
5	7	11	5
6	9	6	6
7	11	1	7
8	12	8	8
9	14	3	9
10	15	10	10
11	17	5	11
12	19	0	12
13	20	7	13
14	22	2	14
15	23	9	15
16	25	4	16
17	26	11	17
18	28	6	18
19	30	1	19
20	31	8	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			39
½			78
¾		1	18
1		1	58
2		3	16
3		4	74
4		6	32
5		7	90
6		9	48
7		11	6
8	1	0	65
9	1	2	24
10	1	3	83
11	1	5	42
12	1	7	1

Creeper Rafters 1ft. 10in. shorter each pair for 1ft. 6in. spacing

H

8 ft. 9in. RISE to 12 ft. RUN. 35¼ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts
1	1	2	85
2	2	5	70
3	3	8	55
4	4	11	40
5	6	2	2
6	7	5	10
7	8	7	95
8	9	10	80
9	11	1	65
10	12	4	50
11	13	7	35
12	14	10	20
13	16	1	5
14	17	3	90
15	18	6	75
16	19	9	60
17	21	0	45
18	22	3	30
19	23	6	15
20	24	9	0

Half Span Ins.	Ft	Ins.	Hts.
¼			30
½			61
¾			92
1		1	23
2		2	46
3		3	69
4		4	92
5		6	17
6		7	41
7		8	65
8		9	89
9		11	13
10	1	0	37
11	1	1	61
12	1	2	85

Plumb Cut Rftr.	4 x 2 15/16
Side Cut Rftr.	4 x 5
Plumb Cut Hip	4 x 2 1/16
Side Cut Hip	4 x 4½
Down Cut Purl.	4 x 2 15/32
Side Cut Purl.	4 x 3⅜

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	12
2	3	2	24
3	4	9	36
4	6	4	48
5	7	11	60
6	9	6	72
7	11	1	84
8	12	8	96
9	14	4	8
10	15	11	20
11	17	6	32
12	19	1	44
13	20	8	56
14	22	3	68
15	23	10	80
16	25	5	92
17	27	1	4
18	28	8	16
19	30	3	28
20	31	10	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			39
½			78
¾		1	18
1		1	59
2		3	18
3		4	77
4		6	36
5		7	95
6		9	54
7		11	13
8	1	0	72
9	1	2	32
10	1	3	92
11	1	5	52
12	1	7	12

Creeper Rafters 1ft. 10¼in. shorter each pair for 1ft. 6in. spacing.

⅜th Pitch. 9 ft. RISE to 12 ft. RUN. 36 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts	Half Span Ins.	Ft.	Ins.	Hts.
1	1	3	0	¼			31
2	2	6	0	½			62
3	3	9	0	¾			93
4	5	0	0	1		1	25
5	6	3	0	2		2	50
6	7	6	0	3		3	75
7	8	9	0	4		5	0
8	10	0	0	5		6	25
9	11	3	0	6		7	50
10	12	6	0	7		8	75
11	13	9	0	8		10	0
12	15	0	0	9		11	25
13	16	3	0	10	1	0	50
14	17	6	0	11	1	1	75
15	18	9	0	12	1	3	0
16	20	0	0				
17	21	3	0				
18	22	6	0				
19	23	9	0				
20	25	0	0				

Plumb Cut Rftr.	4 x 3
Side Cut Rftr.	4 x 5 1/16
Plumb Cut Hip	4 x 2⅛
Side Cut Hip	4 x 4 9/16
Down Cut Purl.	4 x 2½
Side Cut Purl	4 x 3 5/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	7	24	¼			40
2	3	2	48	½			80
3	4	9	72	¾		1	20
4	6	4	96	1		1	60
5	8	0	20	2		3	20
6	9	7	44	3		4	80
7	11	2	68	4		6	40
8	12	9	92	5		8	0
9	14	5	16	6		9	60
10	16	0	40	7		11	20
11	17	7	64	8	1	0	20
12	19	2	88	9	1	2	40
13	20	10	12	10	1	4	2
14	22	5	36	11	1	5	62
15	24	0	60	12	1	7	24
16	25	7	84				
17	27	3	8				
18	29	10	30				
19	30	5	56				
20	32	0	80				

Creeper Rafters 1ft. 10½in. shorter each pair for 1ft. 6in. spacing

9 ft. 3 in. RISE to 12 ft. RUN. 36 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	3	12
2	2	6	24
3	3	9	36
4	5	0	48
5	6	3	60
6	7	6	72
7	8	9	84
8	10	0	96
9	11	4	8
10	12	7	20
11	13	10	32
12	15	1	44
13	16	4	56
14	17	7	68
15	18	10	80
16	20	1	92
17	21	5	4
18	22	8	16
19	23	11	28
20	25	2	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			31
1/2			62
3/4			94
1		1	26
2		2	52
3		3	78
4		5	4
5		6	30
6		7	56
7		8	82
8		10	8
9		11	34
10	1	0	60
11	1	1	86
12	1	3	12

Plumb Cut Rftr.	4 x 3 1/8
Side Cut Rftr.	4 x 5 1/16
Plumb Cut Hip	4 x 2 3/16
Side Cut Hip	4 x 4 1/8
Down Cut Purl.	4 x 2 17/32
Side Cut Purl.	4 x 3 5/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	36
2	3	2	72
3	4	10	8
4	6	5	44
5	8	0	80
6	9	8	16
7	11	3	52
8	12	10	88
9	14	6	24
10	16	1	60
11	17	8	96
12	19	4	32
13	20	11	68
14	22	7	4
15	24	2	40
16	25	9	76
17	27	5	12
18	29	0	48
19	30	7	84
20	32	3	20

Half Span Ins.	Ft.	Ins.	Hts.
1/4			40
1/2			80
3/4		1	20
1		1	61
2		3	32
3		4	83
4		6	44
5		8	5
6		9	66
7		11	27
8	1	0	88
9	1	2	50
10	1	4	12
11	1	5	74
12	1	7	36

Creeper Rafters 1ft. 10 9/16 in. shorter each pair for 1ft. 6in. spacing.

9 ft. 6 in. RISE to 12 ft. RUN. 37½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	3	25
2	2	6	50
3	3	9	75
4	5	1	0
5	6	4	25
6	7	7	50
7	8	10	75
8	10	2	0
9	11	5	25
10	12	8	50
11	13	11	75
12	15	3	0
13	16	6	25
14	17	9	50
15	19	0	75
16	20	4	0
17	21	7	25
18	22	10	50
19	24	1	75
20	25	5	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			31
½			63
¾			95
1		1	27
2		2	54
3		3	81
4		5	8
5		6	35
6		7	62
7		8	89
8		10	16
9		11	43
10	1	0	70
11	1	1	97
12	1	3	25

Plumb Cut Rftr.	4 x 3 3/16
Side Cut Rftr.	4 x 5 1/8
Plumb Cut. Hip	4 x 2 1/4
Side Cut Hip	4 x 4 5/8
Down Cut Purl.	4 x 2 9/16
Side Cut Purl.	4 x 3 1/4

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	48
2	3	2	96
3	4	10	44
4	6	5	92
5	8	1	40
6	9	8	88
7	11	4	36
8	12	11	84
9	14	7	32
10	16	2	80
11	17	10	28
12	19	5	76
13	21	1	24
14	22	8	72
15	24	4	20
16	25	11	68
17	27	7	16
18	29	2	64
19	30	10	12
20	32	5	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			40
½			80
¾		1	21
1		1	62
2		3	24
3		4	86
4		6	48
5		8	10
6		9	72
7		11	34
8	1	0	96
9	1	2	59
10	1	4	22
11	1	5	85
12	1	7	48

Creeper Rafters 1ft. 10 7/8in. shorter each pair for 1ft. 6in. spacing.

9 ft. 9 in. RISE to 12 ft. RUN. 38¼ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	3	38
2	2	6	76
3	3	10	14
4	5	1	52
5	6	4	90
6	7	8	28
7	8	11	66
8	10	3	4
9	11	6	42
10	12	9	80
11	14	1	18
12	15	4	56
13	16	7	94
14	17	11	32
15	19	2	70
16	20	6	8
17	21	9	46
18	23	0	84
19	24	4	22
20	25	7	60

Half Span Ins.	Ft.	Ins.	Hts
¼			32
½			64
¾			96
1		1	28
2		2	56
3		3	84
4		5	12
5		6	40
6		7	68
7		8	96
8		10	24
9		11	52
10	1	0	80
11	1	2	9
12	1	3	38

Plumb Cut Rftr.	4 x 3¼
Side Cut Rftr.	4 x 5 5/16
Plumb Cut Hip	4 x 2 5/16
Side Cut Hip	4 x 4 11/16
Down Cut Purl.	4 x 2 19/32
Side Cut Purl.	4 x 3¼

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	60
2	3	3	20
3	4	10	80
4	6	6	40
5	8	2	0
6	9	9	60
7	11	5	20
8	13	0	80
9	14	8	40
10	16	4	0
11	17	11	60
12	19	7	20
13	21	2	80
14	22	10	40
15	24	6	0
16	26	1	60
17	27	9	40
18	29	4	80
19	30	0	40
20	32	8	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			40
½			60
¾		1	21
1		1	63
2		3	26
3		4	89
4		6	52
5		8	15
6		9	78
7		11	41
8	1	1	4
9	1	2	68
10	1	4	32
11	1	5	96
12	1	7	60

Creeper Rafters 1ft. 11 1/16 in. shorter each pair for 1ft. 6in. spacing.

5/12th Pitch. 10 ft. RISE to 12 ft. RUN. 39 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	3	63
2	2	7	26
3	3	10	89
4	5	2	52
5	6	6	15
6	7	9	78
7	9	1	41
8	10	5	4
9	11	8	67
10	13	0	30
11	14	3	93
12	15	7	56
13	16	11	19
14	18	2	82
15	19	6	45
16	20	10	8
17	22	1	71
18	23	5	34
19	24	9	97
20	26	0	60

Half Span Ins.	Ft.	Ins.	Hts
1/4			32
1/2			65
3/4			98
1		1	30
2		2	60
3		3	90
4		5	21
5		6	51
6		7	81
7		9	11
8		10	42
9		11	72
10	1	1	2
11	1	2	32
12	1	3	63

Plumb Cut Rftr.	4 x 3 3/8
Side Cut Rftr..	4 x 5 1/4
Plumb Cut Hip	4 x 2 3/8
Side Cut Hip	4 x 4 11/16
Down Cut Purl.	4 x 2 3/8
Mitre Cut Purl.	4 x 3/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	72
2	3	3	44
3	4	11	16
4	6	6	88
5	8	2	60
6	9	10	32
7	11	6	4
8	13	1	76
9	14	9	48
10	16	5	20
11	18	0	92
12	19	8	64
13	21	4	36
14	23	0	8
15	24	7	80
16	26	3	52
17	27	11	24
18	29	6	96
19	31	2	68
20	32	10	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			41
1/2			82
3/4		1	23
1		1	64
2		3	28
3		4	92
4		6	56
5		8	20
6		9	84
7		11	48
8	1	1	12
9	1	2	77
10	1	4	42
11	1	6	7
12	1	7	72

Creeper Rafters 1ft. 11 1/4in. shorter each pair for 1ft. 6in. spacing.

10 ft. 3 in. RISE to 12 ft. RUN. 39¾ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	3	71	¼			32
2	2	7	42	½			64
3	3	11	13	¾			97
4	5	2	84	1		1	30
5	6	6	55	2		2	61
6	7	10	26	3		3	92
7	9	1	97	4		5	23
8	10	5	68	5		6	54
9	11	9	39	6		7	85
10	13	1	10	7		9	16
11	14	4	81	8		10	47
12	15	8	52	9		11	78
13	17	0	23	10	1	1	9
14	18	3	94	11	1	2	40
15	19	7	65	12	1	3	71
16	20	11	36				
17	22	3	7				
18	23	6	78				
19	24	10	49				
20	26	2	20				

Plumb Cut Rftr.	4 x 3⅜
Side Cut Rftr.	4 x 5 5/16
Plumb Cut Hip	4 x 2 7/16
Side Cut Hip	4 x 4½
Down Cut Purl.	4 x 2 21/32
Side Cut Purl.	4 x 3 5/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	7	85	¼			41
2	3	2	70	½			82
3	4	11	55	¾		1	23
4	6	7	40	1		1	65
5	8	3	25	2		3	30
6	9	11	10	3		4	95
7	11	6	95	4		6	60
8	13	2	80	5		8	25
9	14	10	65	6		9	90
10	16	6	50	7		11	55
11	18	2	35	8	1	1	20
12	19	10	20	9	1	2	85
13	21	6	5	10	1	4	50
14	23	1	90	11	1	6	18
15	24	9	75	12	1	7	85
16	26	5	60				
17	28	1	45				
18	29	9	20				
19	31	5	15				
20	33	0	0				

Creeper Rafters
1ft. 11 9/16 in. shorter
each pair for
1ft. 6in. spacing

10 ft. 6 in. RISE to 12 ft. RUN. 40½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	3	90
2	2	7	80
3	3	11	70
4	5	3	60
5	6	7	50
6	7	11	40
7	9	3	30
8	10	7	20
9	11	11	10
10	13	3	0
11	14	6	90
12	15	10	80
13	17	2	70
14	18	6	60
15	19	10	50
16	21	2	40
17	22	6	30
18	23	10	20
19	25	2	10
20	26	6	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			33
½			66
¾			99
1		1	32
2		2	64
3		3	96
4		5	28
5		6	60
6		7	92
7		9	25
8		10	58
9		11	91
10	1	1	24
11	1	2	57
12	1	3	90

Plumb Cut Rftr.	4 x 3½
Side Cut Rftr.	4 x 5⅜
Plumb Cut Hip	4 x 2½
Side Cut Hip	4 x 4¾
Down Cut Purl.	4 x 2 11/16
Side Cut Purl.	4 x 3⅛

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	98
2	3	3	96
3	4	11	94
4	6	7	92
5	8	3	90
6	9	11	88
7	11	7	86
8	13	3	84
9	14	11	82
10	15	7	80
11	18	3	78
12	19	11	76
13	21	7	74
14	23	3	72
15	24	11	70
16	26	7	68
17	28	3	66
18	29	11	64
19	31	7	62
20	33	3	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			41
½			82
¾		1	24
1		1	66
2		3	22
3		4	88
4		6	54
5		8	20
6		9	86
7		11	53
8	1	1	20
9	1	2	89
10	1	4	64
11	1	6	31
12	1	7	98

Creeper Rafters
1ft. 11⅞in. shorter each pair for 1ft. 6in. spacing.

10 ft. 9 in. RISE to 12 ft. RUN. 41¼ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	4	9
2	2	8	18
3	4	0	27
4	5	4	36
5	6	8	45
6	8	0	54
7	9	4	63
8	10	8	72
9	12	0	81
10	13	4	90
11	14	8	99
12	16	1	8
13	17	5	17
14	18	9	26
15	20	1	35
16	21	5	44
17	22	9	53
18	24	1	62
19	25	5	71
20	26	9	80

Half Span Ins.	Ft.	Ins.	Hts.
¼			33
½			66
¾		1	0
1		1	34
2		2	68
3		4	2
4		5	36
5		6	70
6		8	4
7		9	38
8		10	72
9	1	0	6
10	1	1	40
11	1	2	74
12	1	4	9

Plumb Cut Rftr.	4 x 3 9/16
Side Cut Rftr.	4 x 5 7/16
Plumb Cut Hip	4 x 2 9/16
Side Cut Hip	4 x 4 13/16
Down Cut Purl.	4 x 3 23/32
Side Cut Purl.	4 x 3 1/8

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	8	11
2	3	4	22
3	5	0	33
4	6	8	44
5	8	4	55
6	10	0	65
7	11	8	77
8	13	4	88
9	15	0	99
10	16	9	10
11	18	5	21
12	20	1	32
13	21	9	43
14	23	5	54
15	25	1	65
16	26	9	76
17	28	5	87
18	30	1	98
19	31	10	9
20	33	6	20

Half Span Ins.	Ft.	Ins.	Hts.
¼			42
½			84
¾		1	26
1		1	67
2		3	34
3		5	1
4		6	68
5		8	35
6		10	3
7		11	71
8	1	1	39
9	1	3	7
10	1	4	75
11	1	6	43
12	1	8	11

Creeper Rafters 2ft ⅛in. shorter each pair for 1ft. 6in. spacing.

$^{11}/_{24}$th Pitch. 11 ft. RISE to 12 ft. RUN. 42 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	4	28	½			34
2	2	8	56	1			68
3	4	0	84	1½		1	4
4	5	5	12	2		1	35
5	6	9	40	3		2	70
6	8	1	68	4		4	5
7	9	5	96	5		5	37
8	10	10	24	6		6	72
9	12	2	52	7		8	8
10	13	6	60	8		9	44
11	14	11	8	9		10	80
12	16	3	36	10	1	0	16
13	17	7	64	11	1	1	52
14	18	11	92	12	1	2	92
15	20	4	20		1	4	28
16	21	8	48				
17	23	0	76				
18	24	5	4				
19	25	9	32				
20	27	1	60				

Plumb Cut Rftr.	4 x 3⅜
Side Cut Rftr.	4 x 5½
Plumb Cut Hip	4 x 2⅝
Side Cut Hip	4 x 4$^{13}/_{16}$
Down Cut Purl.	4 x 2¾
Side Cut Purl.	4 x 3$^{1}/_{16}$

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	8	25	½			42
2	3	4	50	1			84
3	5	0	75	1½		1	26
4	6	9	0	1		1	68
5	8	5	25	2		3	36
6	10	1	50	3		5	4
7	11	9	75	4		6	73
8	13	6	0	5		8	41
9	15	2	25	6		10	10
10	16	10	50	7		11	79
11	18	6	75	8	1	1	48
12	20	3	0	9	1	3	17
13	21	11	25	10	1	4	86
14	23	7	50	11	1	6	55
15	25	3	75	12	1	8	25
16	27	0	0				
17	28	8	25				
18	30	4	50				
19	32	0	75				
20	33	9	0				

Creeper Rafters 2ft. ⅜in. shorter each pair for 1ft. 6in. spacing.

11 ft. 3 in. RISE to 12 ft. RUN. 42¾ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	4	45
2	2	8	90
3	4	1	35
4	5	5	80
5	6	10	25
6	8	2	70
7	9	7	15
8	10	11	60
9	12	4	5
10	13	8	50
11	15	0	95
12	16	5	40
13	17	9	85
14	19	2	30
15	20	6	25
16	21	11	20
17	23	3	65
18	24	8	10
19	26	0	55
20	27	5	0

Half Span Ins.	Ft.	Ins.	Hts.
¼			34
½			69
¾		1	2
1		1	37
2		2	74
3		4	11
4		5	48
5		6	85
6		8	22
7		9	59
8		10	96
9	1	0	33
10	1	1	70
11	1	3	7
12	1	4	45

Plumb Cut Rftr.	4 x 3¾
Side Cut Rftr.	4 x 5 9/16
Plumb Cut Hip	4 x 2 11/16
Side Cut Hip	4 x 4⅞
Down Cut Purl	4 x 2 25/32
Side Cut Purl.	4 x 3 1/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	8	38
2	3	4	76
3	5	1	14
4	6	9	52
5	8	5	90
6	10	2	28
7	11	10	66
8	13	7	4
9	15	3	42
10	16	11	80
11	18	8	18
12	20	4	56
13	22	0	94
14	23	9	32
15	25	5	70
16	27	2	8
17	28	10	46
18	30	6	81
19	32	3	22
20	33	11	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			41
½			82
¾		1	23
1		1	69
2		3	38
3		5	8
4		6	78
5		8	48
6		10	18
7		11	88
8	1	1	58
9	1	3	28
10	1	4	98
11	1	6	68
12	1	8	38

Creeper Rafters 2ft. 11/16in. shorter each pair for 1ft. 6in. spacing.

11 ft. 6 in. RISE to 12 ft. RUN. 43½ Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	4	62
2	2	9	24
3	4	1	86
4	5	6	48
5	6	11	10
6	8	3	72
7	9	8	34
8	11	0	96
9	12	5	58
10	13	10	20
11	15	2	80
12	16	7	44
13	18	0	6
14	19	4	68
15	20	9	30
16	22	1	92
17	23	6	54
18	24	11	16
19	26	3	78
20	27	8	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			34
½			69
¾		1	3
1		1	38
2		2	76
3		4	14
4		5	52
5		6	90
6		8	28
7		9	76
8		11	15
9	1	0	54
10	1	1	94
11	1	3	33
12	1	4	62

Plumb Cut Rftr.	4 x 3⅞
Side Cut Rftr.	4 x 5⅝
Plumb Cut Hip	4 x 2¾
Side Cut Hip	4 x 4⅞
Down Cut Purl.	4 x 2 13/16
Side Cut Purl.	4 x 3

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	8	52
2	3	5	14
3	5	1	56
4	6	10	84
5	8	6	60
6	10	3	12
7	11	11	64
8	13	8	16
9	15	4	68
10	17	1	20
11	18	9	72
12	20	6	24
13	22	2	76
14	23	11	28
15	25	7	80
16	27	4	32
17	29	0	84
18	30	9	36
19	32	5	80
20	34	2	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			42
½			85
¾		1	27
1		1	71
2		3	42
3		5	13
4		6	84
5		8	55
6		10	26
7		11	97
8	1	1	68
9	1	3	39
10	1	5	10
11	1	6	81
12	1	8	52

Creeper Rafters 2ft 7/8in. shorter each pair for 1ft. 6in. spacing.

11 ft. 9in. RISE to 12 ft. RUN. 44 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	4	79
2	2	9	58
3	4	2	37
4	5	7	16
5	6	11	95
6	8	4	74
7	9	9	53
8	11	3	32
9	12	7	11
10	13	11	90
11	15	4	69
12	16	9	48
13	18	2	27
14	19	7	6
15	20	11	85
16	22	4	64
17	23	9	43
18	25	2	22
19	26	7	1
20	27	11	80

Half Span Ins.	Ft.	Ins.	Hts.
1/4			34
1/2			69
3/4		1	4
1		1	39
2		2	74
3		4	19
4		5	59
5		6	99
6		8	39
7		9	79
8		11	19
9	1	0	59
10	1	1	99
11	1	3	39
12	1	4	79

Plumb Cut Rftr.	4 x 3 15/16
Side Cut Rftr.	4 x 5 1/2
Plumb Cut Hip	4 x 2 13/16
Side Cut Hip	4 x 4 15/16
Down Cut Purl.	4 x 2 27/32
Side Cut Purl.	4 x 3

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	8	66
2	3	5	32
3	5	1	98
4	6	10	64
5	8	7	30
6	10	3	76
7	12	0	62
8	13	9	28
9	15	5	94
10	17	2	60
11	18	11	26
12	20	5	92
13	22	4	58
14	24	1	24
15	25	9	90
16	27	6	56
17	29	3	22
18	30	11	88
19	32	8	54
20	34	5	20

Half Span Ins.	Ft.	Ins.	Hts.
1/4			43
1/2			86
3/4		1	29
1		1	72
2		3	44
3		5	16
4		6	88
5		8	60
6		10	32
7	1	0	4
8	1	1	78
9	1	3	48
10	1	5	20
11	1	6	93
12	1	8	66

Creeper Rafters 2ft. 1 3/16 in. shorter each pair for 1ft. 6in. spacing

½ Pitch. 12 ft. RISE to 12 ft. RUN. 45 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	4	97
2	2	9	94
3	4	2	91
4	5	7	88
5	7	0	85
6	8	5	82
7	9	10	79
8	11	3	76
9	12	8	73
10	14	1	70
11	15	6	67
12	16	11	64
13	18	4	61
14	19	9	58
15	21	2	55
16	22	7	52
17	24	0	49
18	25	5	46
19	26	10	43
20	28	3	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			35
½			70
¾		1	5
1		1	41
2		2	82
3		4	23
4		5	64
5		7	5
6		8	46
7		9	87
8		11	29
9	1	0	70
10	1	2	13
11	1	3	55
12	1	4	97

Plumb Cut Rftr.	4 x 4
Side Cut Rftr.	4 x 5 11/16
Plumb Cut Hip	4 x 2 7/8
Side Cut Hip	4 x 4 15/16
Down Cut Purl.	4 x 2 7/8
Side Cut Purl.	4 x 3

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	8	78
2	3	5	56
3	5	2	34
4	6	11	12
5	8	7	90
6	10	4	68
7	12	1	46
8	13	10	24
9	15	7	2
10	17	3	80
11	19	0	58
12	20	9	36
13	22	6	43
14	24	2	92
15	25	11	70
16	27	8	48
17	29	5	26
18	31	2	4
19	32	10	82
20	34	7	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			43
½			86
¾		1	29
1		1	73
2		3	46
3		5	19
4		6	92
5		8	65
6		10	38
7	1	0	11
8	1	1	84
9	1	3	57
10	1	5	30
11	1	7	4
12	1	8	78

Creeper Rafters 2ft. 1 7/16 in. shorter each pair for 1ft. 6in. spacing.

$^{13}/_{24}$th Pitch. 13 ft. RISE to 12 ft. RUN. 47 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	5	69
2	2	11	38
3	4	5	7
4	5	10	76
5	7	4	45
6	8	10	14
7	10	3	83
8	11	9	52
9	13	2	21
10	14	8	90
11	16	2	59
12	17	8	28
13	19	1	97
14	20	7	66
15	22	1	35
16	23	7	4
17	25	0	73
18	26	6	42
19	27	11	11
20	29	4	80

Half Span Ins.	Ft.	Ins.	Hts.
$\frac{1}{4}$			37
$\frac{1}{2}$			74
$\frac{3}{4}$		1	11
1		1	47
2		2	94
3		4	41
4		5	88
5		7	35
6		8	82
7		10	29
8		11	77
9	1	1	24
10	1	2	72
11	1	4	21
12	1	5	69

Plumb Cut Rftr.	4 x 4 $\frac{5}{16}$
Side Cut Rftr.	4 x 6
Plumb Cut Hip	4 x 3
Side Cut Hip	4 x 5 $\frac{1}{32}$
Down Cut Purl.	4 x 3
Side Cut Purl.	4 x 2 $\frac{7}{8}$

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	9	40
2	3	6	80
3	5	4	20
4	7	1	60
5	8	11	0
6	10	8	40
7	12	5	80
8	14	3	20
9	16	0	60
10	17	10	0
11	19	7	40
12	21	4	80
13	23	2	20
14	24	11	60
15	26	9	0
16	28	6	40
17	30	3	80
18	32	1	20
19	33	10	60
20	35	8	0

Half Span Ins.	Ft.	Ins.	Hts.
$\frac{1}{4}$			44
$\frac{1}{2}$			88
$\frac{3}{4}$		1	32
1		1	78
2		3	56
3		5	34
4		7	12
5		8	90
6		10	68
7	1	0	46
8	1	2	24
9	1	4	3
10	1	5	82
11	1	7	62
12	1	9	40

Creeper Rafters
2ft. 2½in. shorter each pair for 1ft. 6in. spacing.

7/12th Pitch. 14 ft. RISE to 12 ft. RUN. 49 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	6	44
2	3	0	88
3	4	7	32
4	6	1	76
5	7	8	20
6	9	2	64
7	10	9	8
8	12	3	52
9	13	9	96
10	15	4	40
11	16	10	84
12	18	5	28
13	19	11	72
14	21	6	16
15	23	0	60
16	24	7	14
17	26	1	48
18	27	7	92
19	29	2	36
20	30	8	80

Half Span Ins.	Ft.	Ins.	Hts.
1/4			38
1/2			76
3/4		1	14
1		1	53
2		3	6
3		4	54
4		6	12
5		7	66
6		9	20
7		10	74
8	1	0	28
9	1	1	82
10	1	3	36
11	1	4	90
12	1	6	44

Plumb Cut Rftr.	4 x 4 11/16
Side Cut Rftr.	4 x 6 1/4
Plumb Cut Hip	4 x 3 5/16
Side Cut Hip	4 x 5 3/16
Down Cut Purl.	4 x 3 1/2
Side Cut Purl.	4 x 2 5/8

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	10	2
2	3	8	4
3	5	6	6
4	7	4	8
5	9	2	10
6	11	0	12
7	12	10	14
8	14	8	16
9	16	6	18
10	18	4	20
11	20	2	22
12	22	0	24
13	23	10	26
14	25	8	28
15	27	6	30
16	29	4	32
17	31	2	34
18	33	0	36
19	34	10	38
20	36	8	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			45
1/2			91
3/4		1	36
1		1	82
2		3	76
3		5	49
4		7	32
5		9	15
6		10	98
7	1	0	82
8	1	2	66
9	1	4	50
10	1	6	34
11	1	8	18
12	1	10	2

Creeper Rafters 2ft. 3 5/8in. shorter each pair for 1ft. 6in. spacing.

5/8th Pitch. 15 ft. RISE to 12 ft. RUN. 51 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	7	21
2	3	2	42
3	4	9	63
4	6	4	89
5	8	0	5
6	9	7	26
7	11	2	47
8	12	9	58
9	14	4	89
10	16	0	10
11	17	7	31
12	19	2	52
13	20	9	73
14	22	4	94
15	24	0	15
16	25	7	36
17	27	2	57
18	28	9	38
19	30	4	99
20	32	0	20

Half Span Ins.	Ft.	Ins.	Hts.
1/4			40
1/2			80
3/4		1	20
1		1	60
2		3	20
3		4	80
4		6	40
5		8	0
6		9	60
7		11	20
8	1	0	80
9	1	2	40
10	1	4	0
11	1	5	60
12	1	7	21

Plumb Cut Rftr.	4 x 5 1/16
Side Cut Rftr.	4 x 6 1/2
Plumb Cut Hip	4 x 3 9/16
Side Cut Hip	4 x 5 3/8
Down Cut Purl.	4 x 3 3/16
Side Cut Purl.	4 x 2 9/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	10	67
2	3	9	34
3	5	8	1
4	7	6	68
5	9	5	35
6	11	4	2
7	13	2	69
8	15	1	36
9	17	0	3
10	18	10	70
11	20	9	37
12	22	8	4
13	24	6	71
14	26	5	38
15	28	4	5
16	30	2	72
17	33	1	39
18	34	0	6
19	35	10	73
20	37	9	40

Half Span Ins.	Ft.	Ins.	Hts.
1/4			47
1/2			94
3/4		1	41
1		1	89
2		3	78
3		5	67
4		7	56
5		9	45
6		11	34
7	1	1	23
8	1	3	12
9	1	5	1
10	1	6	90
11	1	8	79
12	1	10	67

Creeper Rafters 2ft. 4 7/8in. shorter each pair for 1ft. 6in. spacing.

⅔rd. Pitch — 16 ft. RISE to 12 ft. RUN. — 53 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts	Half Span Ins.	Ft.	Ins.	Hts.
1	1	8	0	¼			41
2	3	4	0	½			82
3	5	0	0	¾		1	23
4	6	8	0	1		1	66
5	8	4	0	2		3	32
6	10	0	0	3		4	98
7	11	8	0	4		6	64
8	13	4	0	5		8	30
9	15	0	0	6		9	97
10	16	8	0	7		11	64
11	18	4	0	8	1	1	31
12	20	0	0	9	1	2	98
13	21	8	0	10	1	4	65
14	23	4	0	11	1	6	32
15	25	0	0	12	1	8	0
16	26	8	0				
17	28	4	0				
18	30	0	0				
19	31	8	0				
20	33	4	0				

Plumb Cut Rftr.	4 x 5 7/16
Side Cut Rftr.	4 x 6¾
Plumb Cut Hip	4 x 3 13/16
Side Cut Hip	4 x 5⅝
Down Cut Purl.	4 x 3¼
Side Cut Purl.	4 x 2½

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.	Half Span Ins.	Ft.	Ins.	Hts.
1	1	11	35	¼			48
2	3	10	70	½			96
3	5	10	5	¾		1	45
4	7	9	40	1		1	94
5	9	8	75	6		3	88
6	11	8	10	7		5	82
7	13	7	45	8		7	76
8	15	6	80	9		9	70
9	17	6	15	2		11	64
10	19	5	50	3	1	1	59
11	21	4	85	4	1	3	54
12	23	4	20	5	1	5	49
13	25	3	55	10	1	7	44
14	27	2	90	11	1	9	39
15	29	2	25	12	1	11	35
16	31	1	60				
17	33	0	95				
18	35	0	30				
19	36	11	65				
20	38	11	0				

Creeper Rafters 2ft. 6in. shorter each pair for 1ft. 6in. spacing.

17/24th Pitch. 17 ft. RISE to 12ft. RUN. 54 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	8	81
2	3	5	62
3	5	2	43
4	6	11	24
5	8	8	5
6	10	4	46
7	12	1	67
8	13	10	48
9	15	7	29
10	17	4	10
11	19	0	91
12	20	9	72
13	22	6	53
14	24	3	34
15	26	0	15
16	27	8	96
17	29	5	77
18	30	2	58
19	32	11	39
20	34	8	20

Half Span Ins.	Ft.	Ins.	Hts.
1/4			43
1/2			86
3/4		1	30
1		1	74
2		3	46
3		5	19
4		6	92
5		8	65
6		10	38
7	1	0	11
8	1	1	85
9	1	3	59
10	1	5	33
11	1	7	7
12	1	8	81

Plumb Cut Rftr.	4 x 5 3/4
Side Cut Rftr.	4 x 7
Plumb Cut Hip	4 x 4
Side Cut Hip	4 x 5 3/4
Down Cut Purl.	4 x 3 5/16
Side Cut Purl.	4 x 2 7/16

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	2	0	4
2	4	0	8
3	6	0	12
4	8	0	16
5	10	0	20
6	12	0	24
7	14	0	28
8	16	0	32
9	18	0	36
10	20	0	40
11	22	0	44
12	24	0	48
13	26	0	52
14	28	0	56
15	30	0	60
16	32	0	64
17	34	0	68
18	36	0	72
19	38	0	76
20	40	0	80

Half Span Ins.	Ft.	Ins.	Hts.
1/4			50
1/2		1	0
3/4		1	50
1		2	0
2		4	0
3		6	0
4		8	0
5		10	0
6	1	0	0
7	1	2	0
9	1	4	0
10	1	6	1
11	1	8	2
12	1	10	3
	2	0	4

Creeper Rafters
2ft. 7 3/16 in. shorter each pair for 1ft. 6in. spacing

¾ Pitch. 18 ft. RISE to 12 ft. RUN. 56 Deg.

RAFTER LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	1	9	63
2	3	7	26
3	5	4	89
4	7	2	52
5	9	0	15
6	10	9	78
7	12	7	41
8	14	5	4
9	16	2	67
10	18	0	30
11	19	9	93
12	21	7	56
13	23	5	19
14	25	2	82
15	27	0	45
16	28	10	8
17	30	7	71
18	32	5	34
19	34	2	97
20	36	0	60

Half Span Ins.	Ft.	Ins.	Hts.
¼			45
½			90
¾		1	35
1		1	80
2		3	60
3		5	40
4		7	20
5		9	0
6		10	80
7	1	0	60
8	1	2	40
9	1	4	20
10	1	6	1
11	1	7	82
12	1	9	63

Plumb Cut Rftr.	4 x 6½
Side Cut Rftr.	4 x 7¼
Plumb Cut Hip	4 x 4 5/16
Side Cut Hip	4 x 6
Down Cut Purl.	4 x 3¼
Side Cut Purl.	4 x 2⅜

HIP AND VALLEY LENGTHS

Half Span Feet	Ft.	Ins.	Hts.
1	2	0	76
2	4	1	52
3	6	2	28
4	8	3	4
5	10	3	80
6	12	4	56
7	14	5	32
8	16	6	8
9	18	6	84
10	20	7	60
11	22	8	36
12	24	9	12
13	26	9	88
14	28	10	64
15	30	11	40
16	33	0	16
17	35	0	92
18	37	1	68
19	39	2	44
20	41	3	40

Half Span Ins.	Ft.	Ins.	Hts.
¼			52
½		1	3
¾		1	54
1		2	6
2		4	12
3		6	18
4		8	24
5		10	30
6	1	0	36
7	1	2	42
8	1	4	48
9	1	6	56
10	1	8	64
11	1	10	70
12	2	0	76

Creeper Rafters
2ft. 8 7/16 in. shorter each pair for 1ft. 6in. spacing.

OCTAGON TABLES

1/24 Pitch 4 Deg.
1 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	1	4
2	2	2	8
3	3	3	12
4	4	15	16
5	5	6	20
6	6	7	24
7	7	8	28
8	8	9	32
9	9	10	36
10	10	11	40
11	12	0	44
12	13	1	48
13	14	2	52
14	15	3	56
15	16	4	60
16	17	5	64
17	18	6	68
18	19	7	72
19	20	8	76
20	21	9	80

Plumb Cut Hip - - - - 4 x $\frac{5}{16}$
Side Cut Hip - - - - - 4 x $1\frac{1}{32}$
Plumb Cut Jack - - - - 4 x $\frac{3}{8}$
Side Cut Jack - - - - 4 x $1\frac{11}{16}$

1/12 Pitch 9 Deg.
2 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	1	15
2	2	2	30
3	3	3	45
4	4	4	60
5	5	5	75
6	6	6	90
7	7	8	5
8	8	9	20
9	9	10	35
10	10	11	50
11	12	0	65
12	13	1	80
13	14	2	95
14	15	4	10
15	16	5	25
16	17	5	40
17	18	7	55
18	19	8	70
19	20	9	85
20	21	11	0

Plumb Cut Hip - - - - 4 x $\frac{5}{8}$
Side Cut Hip - - - - - 4 x $\frac{1}{16}$
Plumb Cut Jack - - - - 4 x $\frac{13}{16}$
Side Cut Jack - - - - 4 x $1\frac{21}{32}$

OCTAGON TABLES

¼ Pitch 14 Deg. — 3 ft Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	1	34
2	2	2	68
3	3	4	2
4	4	5	36
5	5	6	70
6	6	8	4
7	7	9	38
8	8	10	72
9	10	0	6
10	11	1	40
11	12	2	74
12	13	4	8
13	14	5	42
14	15	6	76
15	16	8	10
16	17	9	44
17	18	10	78
18	20	0	12
19	21	1	46
20	22	2	80

Plumb Cut Hip	4 x $\frac{15}{16}$
Side Cut Hip	4 x $4\frac{1}{8}$
Plumb Cut Jack	4 x $1\frac{1}{16}$
Side Cut Jack	4 x $1\frac{5}{8}$

⅙ Pitch 18 Deg. — 4 ft Rise to 12 ft Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	1	60
2	2	3	20
3	3	4	80
4	4	6	40
5	5	8	0
6	6	9	60
7	7	11	20
8	9	0	80
9	10	2	40
10	11	4	0
11	12	5	60
12	13	7	20
13	14	8	80
14	15	10	40
15	17	0	0
16	18	1	60
17	19	3	20
18	20	4	80
19	21	6	40
20	22	8	0

Plumb Cut Hip	4 x $1\frac{1}{4}$
Side Cut Hip	4 x $4\frac{3}{16}$
Plumb Cut Jack	4 x $1\frac{1}{2}$
Side Cut Jack	4 x $1\frac{13}{32}$

OCTAGON TABLES

5/24 Pitch 22 Deg.
5 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	1	93
2	2	3	86
3	3	5	79
4	4	7	72
5	5	9	65
6	6	11	58
7	8	1	51
8	9	3	44
9	10	5	37
10	11	7	30
11	12	9	23
12	13	11	16
13	15	1	9
14	16	3	2
15	17	4	95
16	18	6	88
17	19	8	81
18	20	10	74
19	22	0	67
20	23	0	60

Plumb Cut Hip	4 x 1 9/16
Side Cut Hip	4 x 4 5/16
Plumb Cut Jack	4 x 1 11/16
Side Cut Jack	4 x 1 9/16

1/4 Pitch 26 Deg.
6 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	2	32
2	2	4	64
3	3	6	96
4	4	9	28
5	5	11	60
6	7	1	92
7	8	4	24
8	9	6	56
9	10	8	88
10	11	11	20
11	13	1	52
12	14	3	84
13	15	6	16
14	16	8	48
15	17	10	80
16	19	1	12
17	20	3	44
18	21	5	76
19	22	8	8
20	23	10	40

Plumb Cut Hip	4 x 1 7/8
Side Cut Hip	4 x 4 5/16
Plumb Cut Jack	4 x 2
Side Cut Jack	4 x 1 17/32

OCTAGON TABLES

7/24 Pitch — 30 Deg.
7 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	2	76
2	2	5	42
3	3	8	28
4	4	11	4
5	6	1	80
6	7	4	56
7	8	7	32
8	9	10	8
9	11	0	84
10	12	3	60
11	13	6	36
12	14	9	12
13	15	1	88
14	17	2	64
15	18	5	40
16	19	8	16
17	21	10	92
18	22	1	68
19	23	4	44
20	24	7	20

Plumb Cut Hip	4 x 2 3/16
Side Cut Hip	4 x 4 3/16
Plumb Cut Jack	4 x 2 3/8
Side Cut Jack	4 x 1 1/2

1/3 Pitch — 33 Deg.
8 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	3	26
2	2	6	52
3	3	9	78
4	5	1	4
5	6	4	30
6	7	7	56
7	8	10	82
8	10	2	8
9	11	5	34
10	12	8	60
11	13	11	86
12	15	3	12
13	16	6	38
14	17	9	64
15	19	0	90
16	20	4	16
17	21	7	42
18	22	10	68
19	24	1	94
20	25	5	20

Plumb Cut Hip	4 x 2 1/2
Side Cut Hip	4 x 4 3/4
Plumb Cut Jack	4 x 2 3/4
Side Cut Jack	4 x 1 15/16

OCTAGON TABLES

3/8 Pitch — 36 Deg. — 9 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	3	81
2	2	7	62
3	3	11	43
4	5	3	24
5	6	7	5
6	7	10	86
7	9	2	67
8	10	6	48
9	11	10	29
10	13	2	10
11	14	5	91
12	15	9	72
13	17	1	53
14	18	5	34
15	19	9	15
16	21	0	96
17	22	4	77
18	23	8	58
19	25	0	39
20	26	4	20

Plumb Cut Hip	4 x 2 13/16
Side Cut Hip	4 x 4 15/16
Plumb Cut Jack	4 x 3
Side Cut Jack	4 x 1 7/8

5/12 Pitch — 39 Deg. — 10 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	4	40
2	2	8	80
3	4	1	20
4	5	5	60
5	6	10	0
6	8	2	40
7	9	6	80
8	10	11	20
9	12	3	60
10	13	8	0
11	15	0	40
12	16	4	80
13	17	9	20
14	19	0	60
15	20	6	0
16	21	10	40
17	23	2	80
18	24	7	20
19	25	11	60
20	27	4	0

Plumb Cut Hip	4 x 3 1/8
Side Cut Hip	4 x 5 1/8
Plumb Cut Jack	4 x 3 3/8
Side Cut Jack	4 x 1 13/16

OCTAGON TABLES

11/12 Pitch — 42 Deg. — 11 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	5	3
2	2	10	6
3	4	3	9
4	5	8	12
5	7	1	15
6	8	6	18
7	9	11	21
8	11	4	24
9	12	9	27
10	14	2	30
11	15	7	33
12	17	0	36
13	18	5	39
14	19	10	42
15	21	3	45
16	22	8	48
17	24	1	51
18	25	6	54
19	26	11	57
20	28	4	60

Plumb Cut Hip	4 x 3 7/16
Side Cut Hip	4 x 5 5/16
Plumb Cut Jack	4 x 3 11/16
Side Cut Jack	4 x 1 3/4

1/2 Pitch — 45 Deg. — 12 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	5	69
2	2	11	38
3	4	5	7
4	5	10	76
5	7	4	45
6	8	10	14
7	10	3	83
8	11	9	52
9	13	3	21
10	14	8	90
11	16	2	59
12	17	8	28
13	19	1	97
14	20	7	66
15	22	1	35
16	23	7	4
17	25	0	73
18	26	6	42
19	28	0	11
20	29	5	80

Plumb Cut Hip	4 x 3 1/2
Side Cut Hip	4 x 5 9/16
Plumb Cut Jack	4 x 4
Side Cut Jack	4 x 1 3/4

OCTAGON TABLES

13/24 Pitch — 47 Deg. — 13 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	6	38
2	3	0	76
3	4	7	14
4	6	1	52
5	7	7	90
6	9	2	28
7	10	8	66
8	12	3	4
9	13	9	42
10	15	3	80
11	16	10	18
12	18	4	56
13	19	10	94
14	21	5	32
15	22	11	70
16	24	6	8
17	26	0	46
18	27	6	84
19	29	1	22
20	30	7	60

Plumb Cut Hip	4 x 4 1/16
Side Cut Hip	4 x 5 13/16
Plumb Cut Jack	4 x 4 5/16
Side Cut Jack	4 x 1 1/2

7/12 Pitch — 49 Deg. — 14 ft. Rise to 12 ft. Run

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	7	10
2	3	2	20
3	4	9	30
4	6	4	40
5	7	11	50
6	9	6	60
7	11	1	70
8	12	8	80
9	14	3	90
10	15	11	0
11	17	6	10
12	19	1	20
13	20	8	30
14	22	3	40
15	23	10	50
16	25	5	60
17	27	0	70
18	28	7	80
19	30	2	90
20	31	10	0

Plumb Cut Hip	4 x 4 1/8
Side Cut Hip	4 x 6
Plumb Cut Jack	4 x 4 5/8
Side Cut Jack	4 x 1 3/8

OCTAGON TABLES

5/8 Pitch — 51 Deg.
15 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	7	85
2	3	3	70
3	4	11	55
4	6	7	40
5	8	3	25
6	9	11	10
7	11	6	95
8	13	2	80
9	14	10	65
10	16	6	50
11	18	2	35
12	19	10	20
13	21	6	5
14	23	1	90
15	24	9	75
16	26	5	60
17	28	1	45
18	29	9	30
19	31	5	15
20	33	1	0

Plumb Cut Hip	4 x 4 11/16
Side Cut Hip	4 x 6 1/4
Plumb Cut Jack	4 x 5
Side Cut Jack	4 x 1 1/2

16/24 Pitch — 54 Deg.
16 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	8	62
2	3	5	24
3	5	1	86
4	6	10	48
5	8	7	10
6	10	3	72
7	12	0	34
8	13	8	96
9	15	5	58
10	17	2	20
11	18	10	82
12	20	7	44
13	22	4	6
14	24	0	68
15	25	9	30
16	27	5	92
17	29	2	54
18	30	11	10
19	32	7	48
20	34	4	40

Plumb Cut Hip	4 x 5
Side Cut Hip	4 x 6 1/2
Plumb Cut Jack	4 x 5 7/16
Side Cut Jack	4 x 1 1/16

OCTAGON TABLES

17/24 Pitch — 54 Deg.
17 ft. Rise to 12 ft. Run.

Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	9	40
2	3	6	80
3	5	4	20
4	7	1	60
5	8	11	00
6	10	7	40
7	12	4	80
8	14	2	40
9	15	11	60
10	17	10	00
11	19	7	40
12	21	4	80
13	23	2	20
14	24	11	60
15	25	9	00
16	28	6	40
17	30	3	80
18	32	1	20
19	33	10	60
20	35	8	00

Plumb Cut Hip	4 x 5⅛
Side Cut Hip	4 x 6¼
Plumb Cut Jack	4 x 5¾
Side Cut Jack	4 x 1

¾ Pitch — 56 Deg.
18 ft. Rise to 12 ft. Run.

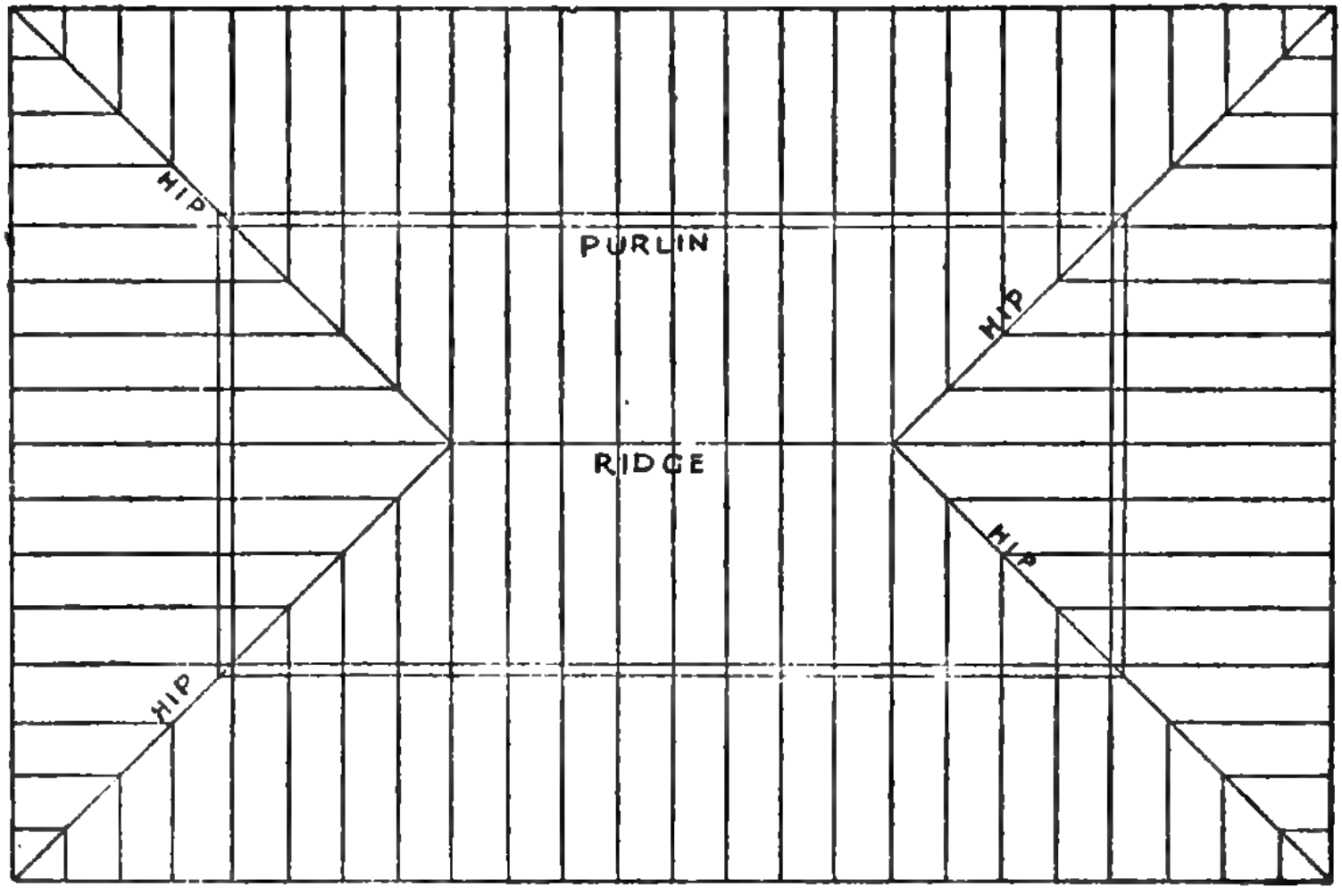
Half Span Feet	HIP LENGTHS Ft.	Ins.	Hths.
1	1	10	20
2	3	8	40
3	5	6	60
4	7	4	80
5	9	3	00
6	11	1	20
7	12	11	40
8	14	9	60
9	16	7	80
10	18	6	00
11	20	4	20
12	22	2	40
13	24	0	60
14	25	10	80
15	27	9	00
16	29	7	20
17	31	5	40
18	33	3	60
19	35	1	80
20	37	0	0

Plumb Cut Hip	4 x 5⅛
Side Cut Hip	4 x 7
Plumb Cut Jack	4 x 6½
Side Cut Jack	4 x ⅞

TILE TABLE

Rafter Lengths		No. of Tiles.
Feet	Inches	
1	3	1
2	4½	2
3	6	3
4	7½	4
5	9	5
6	10½	6
8	0	7
9	1½	8
10	3	9
11	4½	10
12	6	11
13	7½	12
14	9	13
15	10½	14
17	0	15
18	1½	16
19	3	17
20	4½	18
21	6	19
22	7½	20
23	9	21
24	10½	22
26	0	23

ROOF PLAN



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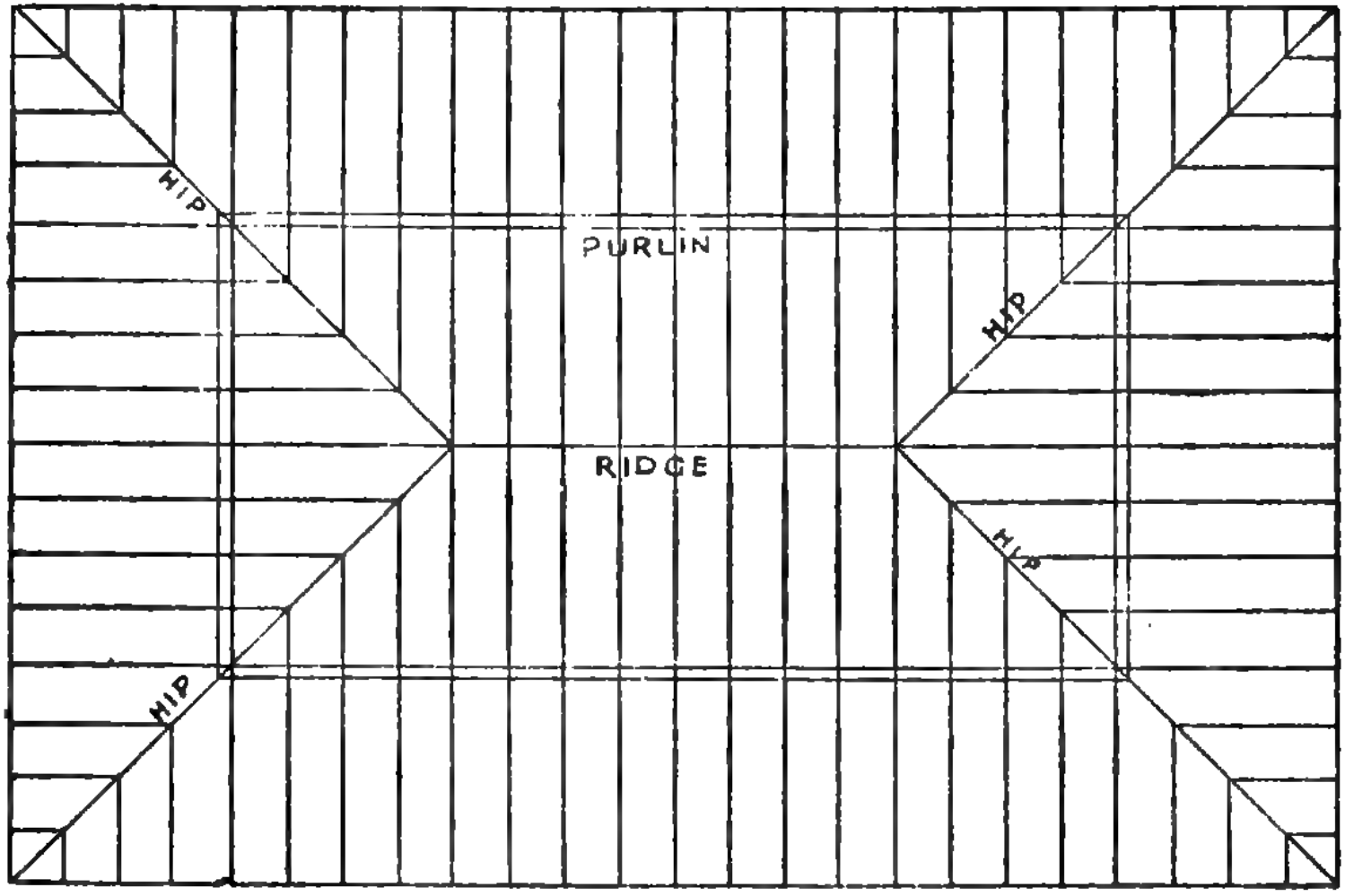

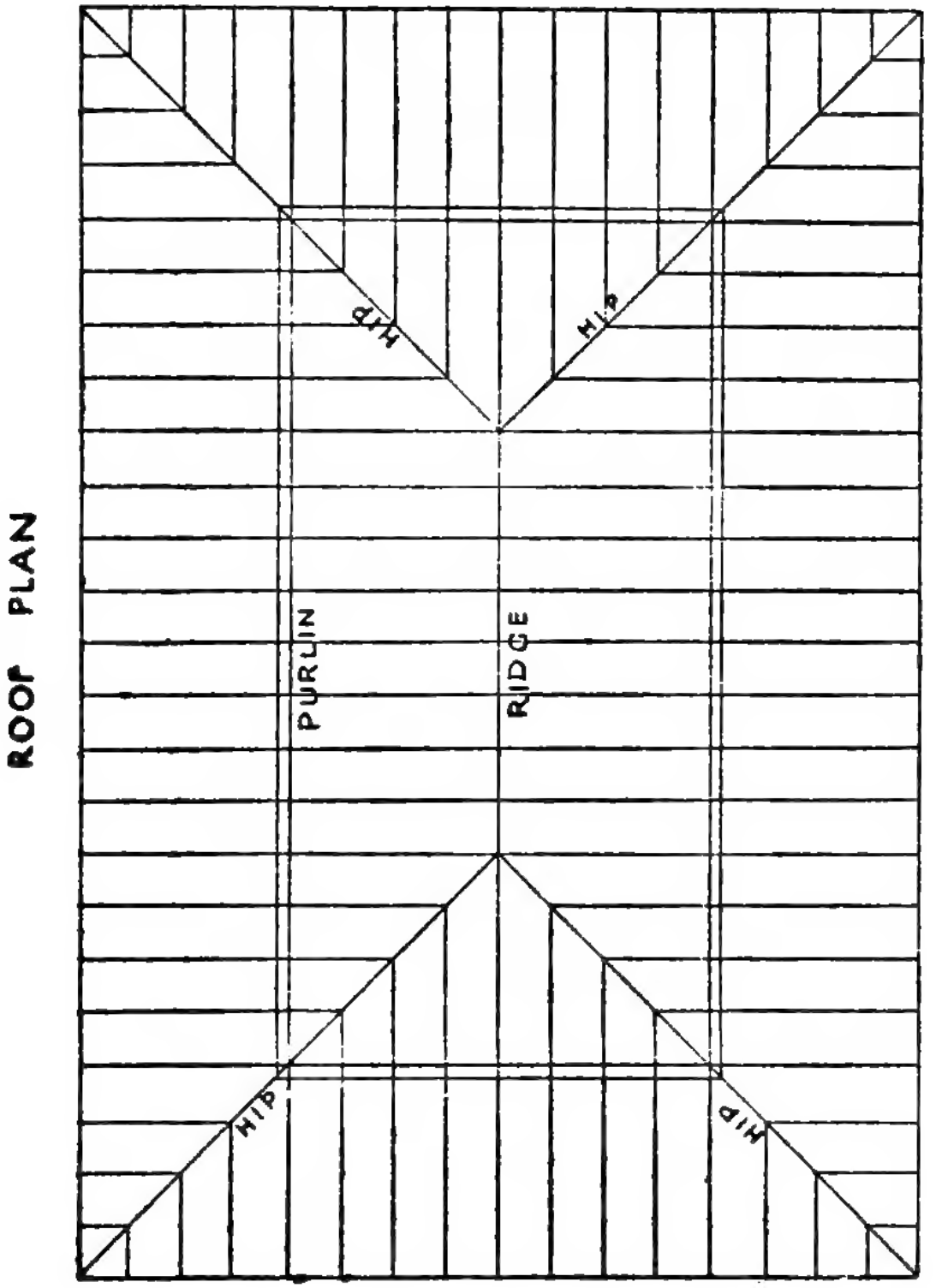
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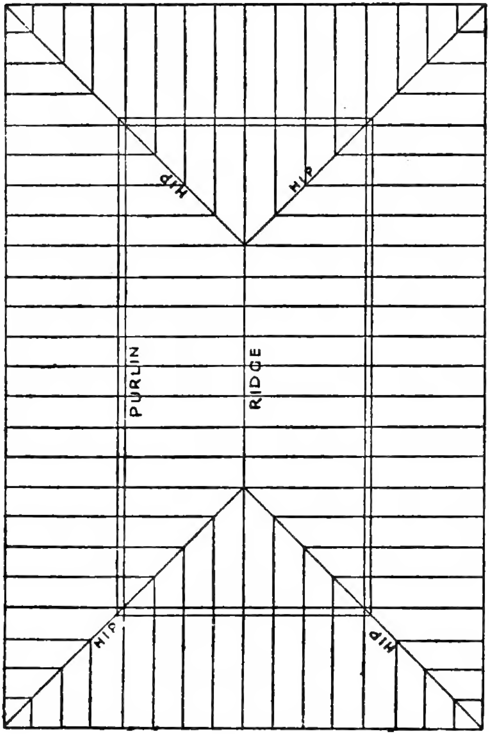

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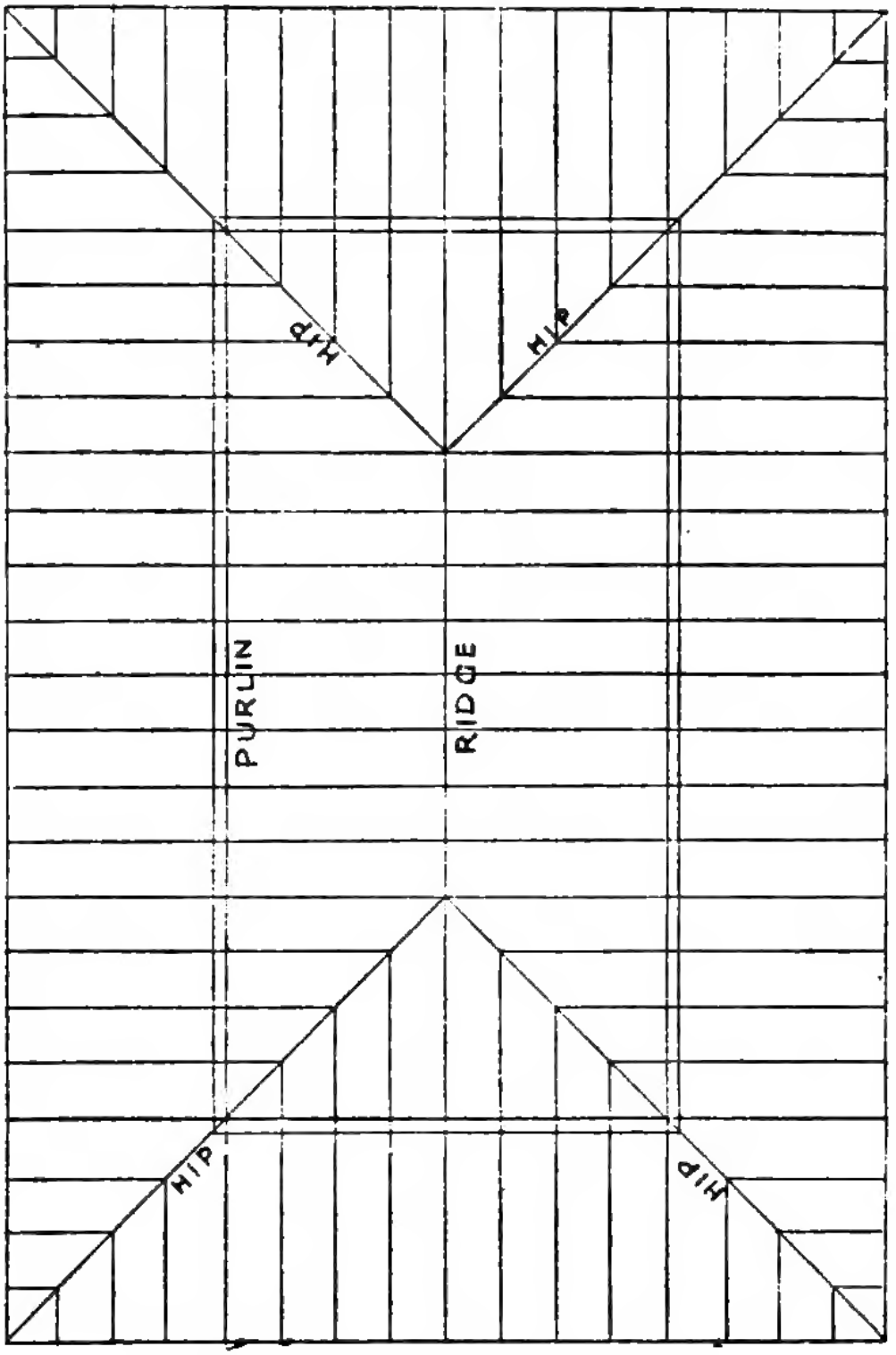

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